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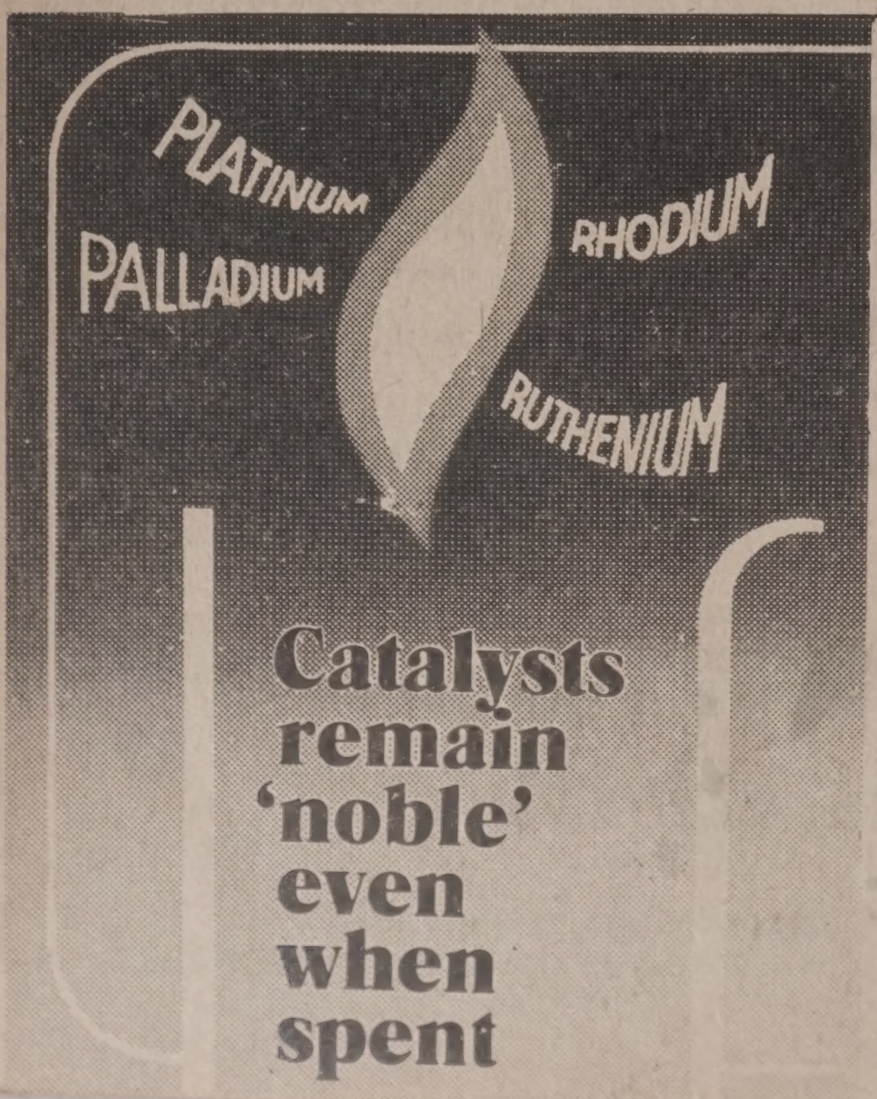

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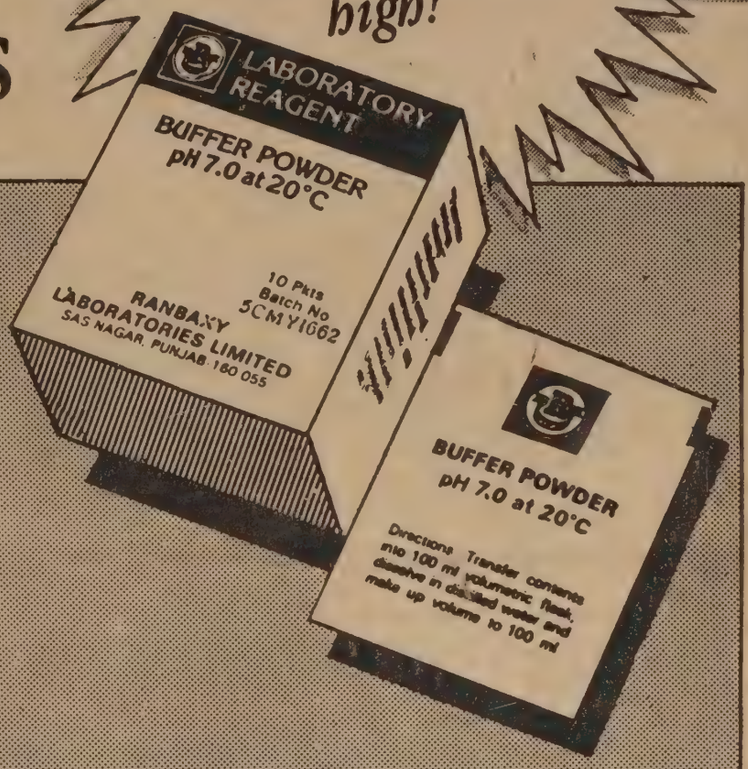

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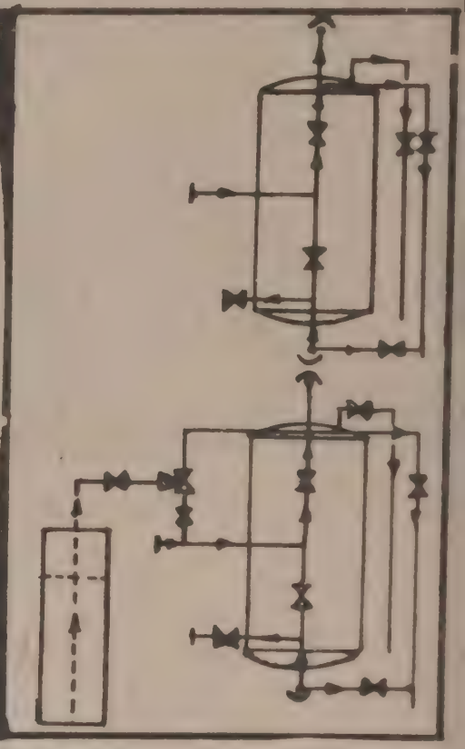

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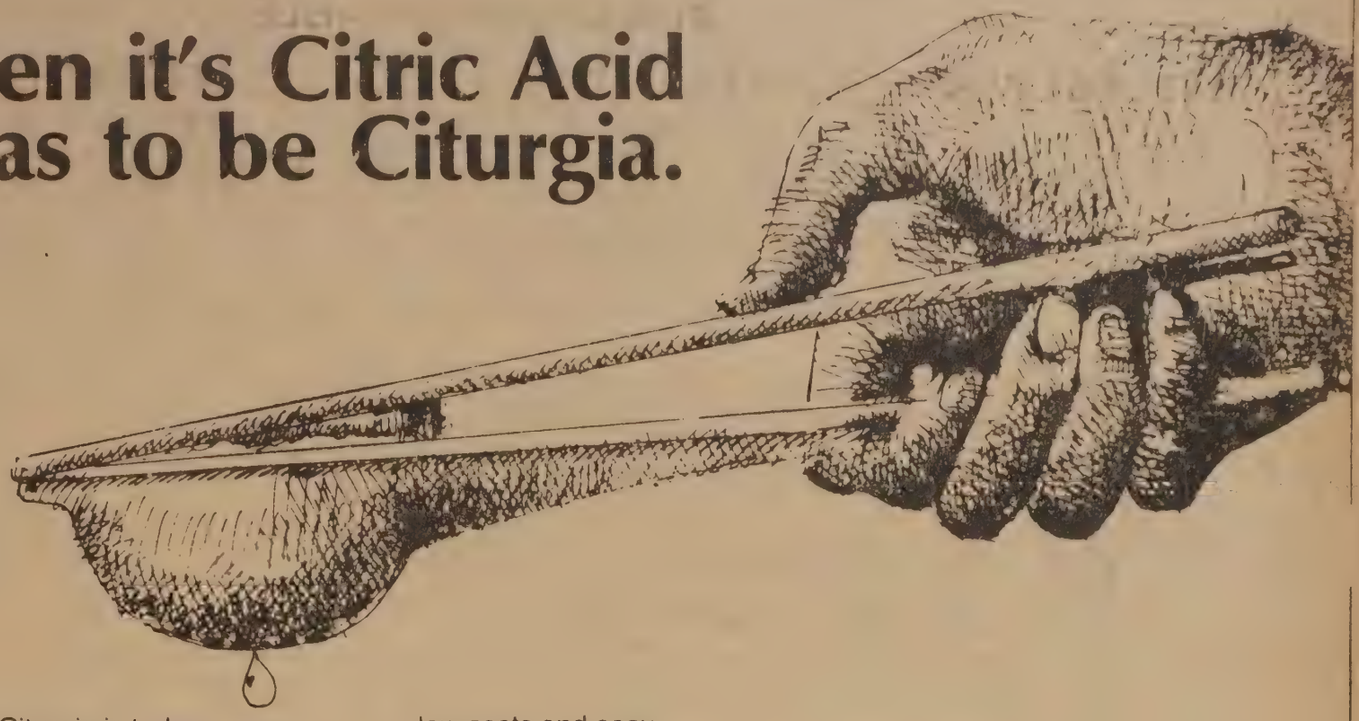

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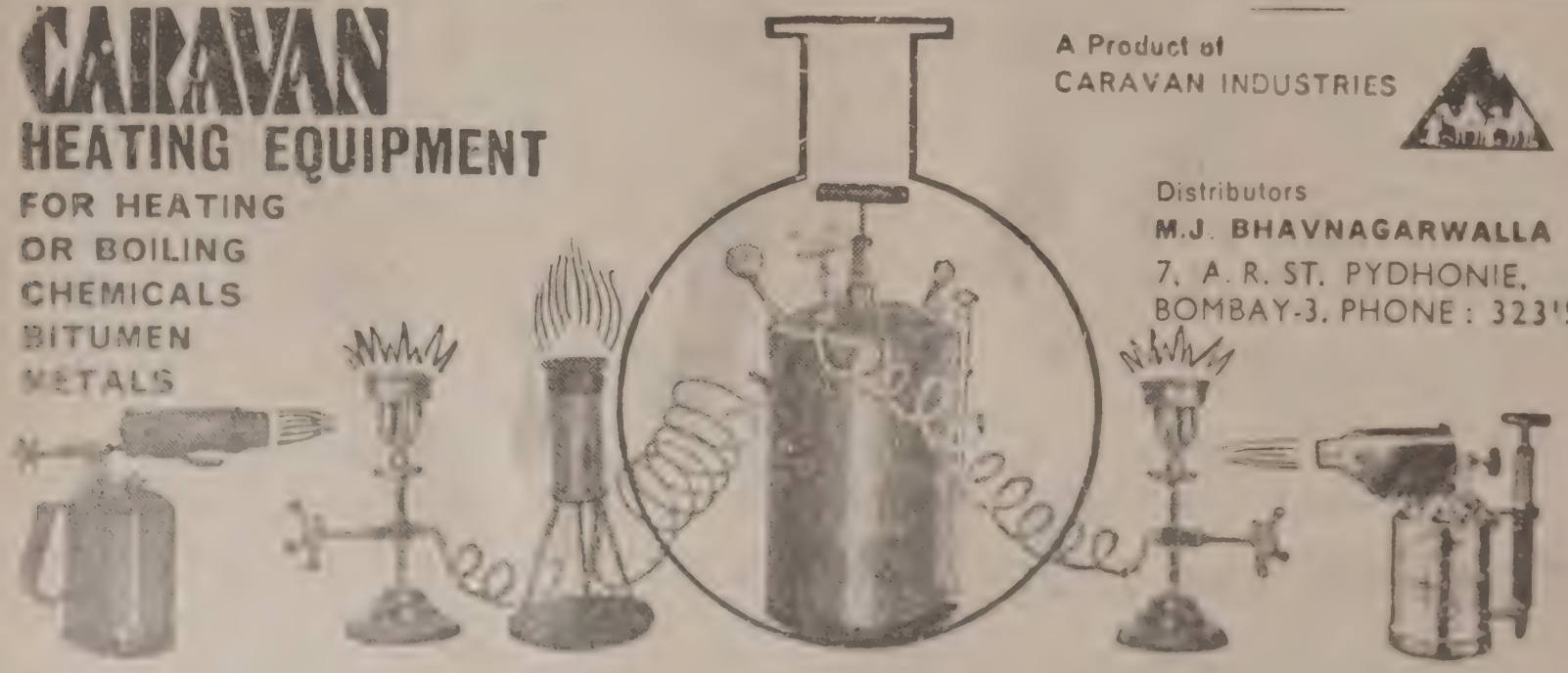

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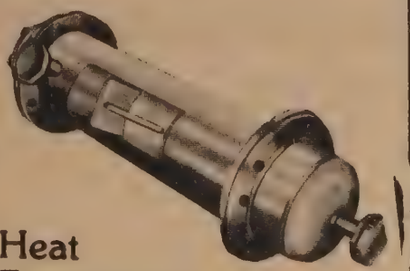
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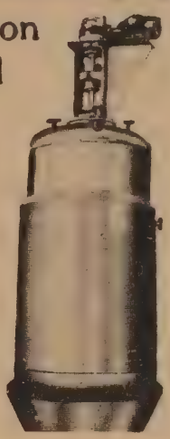

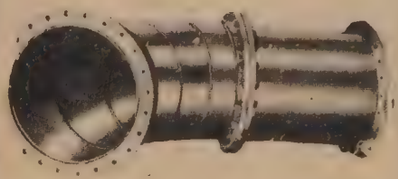
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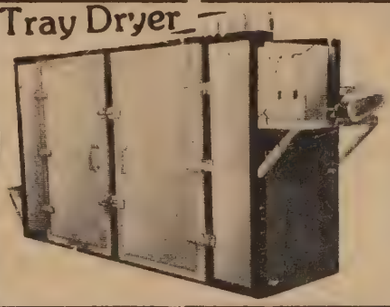

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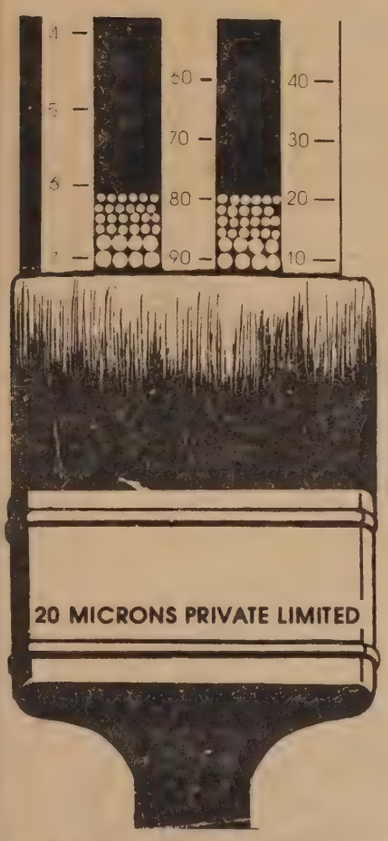

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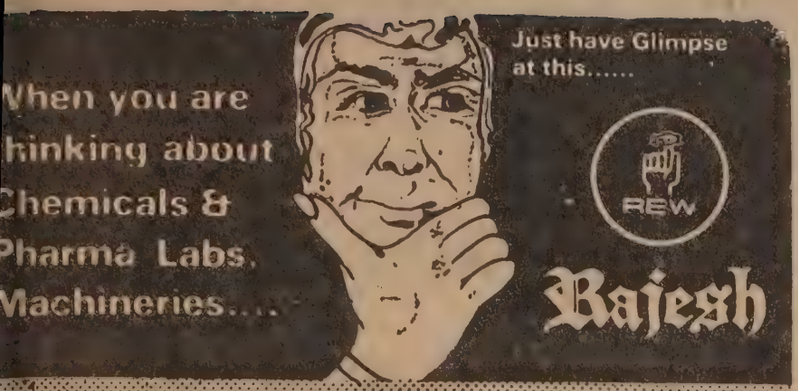

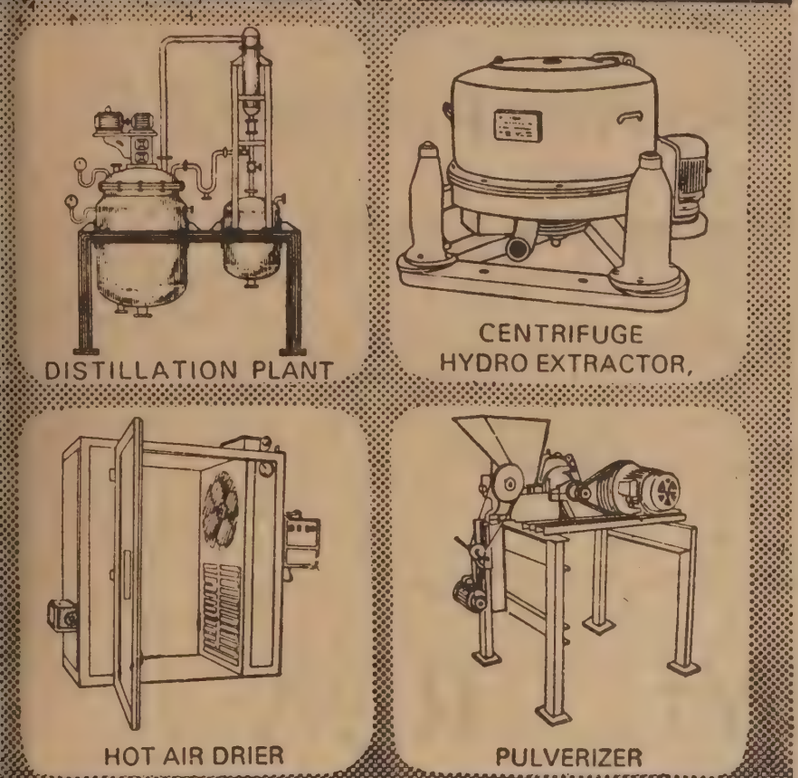

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CHEMICAL WEEKLY

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The Energy crunch — The Oceans to the rescue

The oceans, covering two thirds of the earth's surface area, contain vast amounts of renewable energy in various forms, as yet virtually untapped. While oil and natural gas reserves below the ocean floor have long been exploited, other energy resources inherent to the seas, such as ocean currents, waves, tides, salinity, and thermal gradients have yet to be developed.

Ocean Thermal Energy Conversion (OTEC)

OTEC produces energy from temperature differences between warmer surface ocean waters and those at lower depth. OTEC plants can be located in areas where there is more than 20 degree C (36 degree F) difference in temperatures between the ocean surface and sea water at a depth of 1,000 meters. Estimates of the total energy available through thermal gradients vary between 10,000 and 100,000 MW.

It is estimated that twenty-five developing countries will have OTEC installed capacities of more than 1,000 MW by the year 2010. The US OTEC Research and Development Act (1980) calls for a 100 MW demonstration power plant by 1990, and OTEC is slated to supply 3 percent of all US energy demands (100,000 MW) by the end of the century. The Government of Tamil Nadu had prepared plans for an OTEC project off the shores of Madras.

OTEC plants do not discharge pollutants, use no fuel and provide base-load power round the clock. OTEC development requires large-scale application of existing technology, and advanced techniques are needed for the cold water pipes, the moorings and the subsea cable; this would be cost effective for installation in remote islands when compared to diesel-powered plants. There are two systems — closed and open cycle systems.

The closed cycle system uses a working fluid such as ammonia because of its low boiling point, which is vaporized by warm water from the ocean surface. The pressurised gas is used to drive the turbines.

The open cycle system utilizes sea water as a working fluid. Warm sea water is made to vaporize at low temperatures by creating a partial vacuum, and the resultant pressure is used to drive turbines.

OTEC plants can have multipurpose applications. For example they can act as desalination plants to produce fresh water, an attractive prospect for many island and other countries. OTEC plants can also provide nutrient rich waters for aquaculture and power for such energy intensive industries as aluminium production. India's first OTEC plant (IMW) at Lakshadweep is expected to take off soon.

Power from the Ocean Waves

Anyone who knows the sea has a sense of the power of ocean waves. As we all know, waves are powerful enough to move large ships and wreck damage in harbours and on coastlines. Indeed, the total power of waves breaking against the world's coast-lines is estimated to be between $10^{(12)}$ and $10^{(15)}$ watts—the equivalent of the global consumption of energy.

The energy in ocean waves comes from the wind. The ultimate source is solar radiation, which powers the wind by differentially heating the atmosphere. Like solar energy and the wind itself, wave energy is widely distributed and diffused. And like solar energy, it can be collected in substantial quantities only by large devices or arrays. Still, despite these two advantages over wind, waves remain a diffused and variable source of energy. Under normal conditions, waves deliver

an average of between 10 to 100 kilowatts of power on every meter of beach in the mid-latitudes. But in a severe storm, 1 Megawatt per meter may arrive on the same coastline. Thus any device for harnessing wave energy must be capable of operating successfully—or at least surviving—under a wide range of conditions.

The most advanced large device for harvesting wave energy had been built by a group led by K. Masuda at the Japan Marine Science and Technology Centre in Yokusuka, with support from the International Energy and participation from the United States, Canada, Britain and Ireland.

India's wave power project off the coast of Trivandrum is valiantly attempting to get over the teething troubles.

Tidal Energy

Gravitational and centrifugal forces between the moon, sun and the earth create tides, which shift vast volumes of water on the oceans. Where the range between low and high tides is significant, power can be produced as rising water passes through sluices and turbines to enter an enclosed basin at high tide, to be subsequently released through the turbines when the ocean has receded.

The amount of tidal energy that could potentially be recovered at suitable sites around the world is about 200,000 MW. There are roughly a hundred known sites in the world where the tidal range is adequate for the economic production of electricity. Tidal power technology is well developed, and it is similar to that of hydropower plants used on large rivers.

Tidal power is not expected to make significant contribution to the world energy situation since production costs are high for micro tidal plants which work on average tides of 5 meters. They can be justified only in exceptional circumstances. Plans for tidal plants in the Gulf of Kutch and Gulf of Cambay were considered. Currently, a medium scale 600 MW power plant being considered across the main barrier at Hamshkal in Gujarat is under processing.

Tidal power poses the ultimate challenge to man. For sheer power the tides have no match on earth. The tides at the Bay of Dundy (Canada) alones moves 100 million tons of water twice a day—the water moved is equal to 70 times the daily water flow of the Mississippi.

Oceanic photosynthesis that aims at utilising the biomass available from the ocean as also the exploration of the oceanic temperature difference to grow biomass on a large scale been fields for active research.

There have been encouraging reports about the expl tion of the salinity changes as the river water flows int sea and the consequent emf changes.

It has long been the researchers dream to exploit the terium in the ocean as a source of fusion energy, once relevant technology is developed.

At first glance, a brave new world of limitless supplie energy has been conjured up with the claim by a joint British team of scientists that it has succeeded in harnes fusion power based on experiments conducted at the U versity of Utah. The team claimed that it had triggered nuclear fusion in a small glass reaction vessel. By pass an electrical current through two metal electrodes immer in heavy water containing deuterium, an isotope of hyd gen, the scientists were able to produce more heat from electrode than could be explained in terms of energy pas into it. They apparently triggered nuclear fusion in a hum test-tube virtually in the same manner that the sun and ot stars produce energy. If the experiment is reproduced, hum kind can obtain endless energy from seawater. The bene of nuclear fusion are simply mind-boggling. It would rid world of its crippling dependence on fossil fuels, like c and oil, for nearly all energy needs, and thereby contrib to cleaning the planet. For instance, the deuterium in La Superior alone contains enough fusion power to serve the U for 15,000 years. Moreover, unlike the process of fission, th would be no radioactive waste, though that is also in d pute. Before euphoria sets in, however, it is sobering to re ise that the Utah experiment was conducted on a very sm scale and may not be technologically or commercially viab

We in India have reason to be proud of the contributi of scientists in the TIFR have been making to this forwa area in science.

The oceans occupy one and half times the land area of t earth. The ocean's capacity to absorb and transmit solar he from its liquid surface is many times that of the land su face. Besides the ocean waves respond to the moon in manner which the land surface cannot. All these make t ocean a vastly richer source of safe, clean energy which waiting to be exploited by man's ingenuity and intellect. Ma the twenty first century herald the entry of man into the ar of limitless pollution free source of energy.

-- T.P.S. RAJA

CHEMARENA

.L. VENKITESWARAN

Chemical Industry outlook through French Eyes

France's Society de Chimie International and publisher of formations Chimie have organised an International Chemal Forum to review and assess the chemical industries proess every four years. The first forum was held four years ck and the second held recently with attendance of over 0 delegates from the chemical industry managements ound the world on the theme "Outlook for the year 2000". eport in CEN of 27/3).

There is ever increasing, the international nature of the emical industry and movement into new centres in Middle st and South Asia and South America -- in many cases th the same giants of the industry as participants. The estabhed industry leaders of the West have been seeking areas specialities and high technology products with less empha on commodity chemicals. The ever increasing need for llution control and environment safeguards and safety in oduction and use have more or less emphasised this trend the extent of shutting out some of the production or shiftg them to the greener pastures elsewhere. High Tech chemals or specialities have been growing, absorbing the bulk R&D expenditure.

The largest 100 chemical companies of the world are said account for 50% of the total sales. Other trends in the chemal industry today are noted as:

(a) Cutbacks in personnel and rise in productivity through ter skills and process automation.

(b) Caution in investments with an average of only 5% of sales now as against over 10% in the seventies.

(c) Major thrust towards internationalisation, especially for a share in Asia and get over the exchange rate hurdles and tariff barriers.

(d) More emphasis on profit centres and most value added sectors.

Though total investments for the same value of production is nearly the same for both commodity and speciality chemicals, the sales and R&D inputs are higher on the specialities. There is more risk in specialities but a dominant position in commodity chemicals is a permanent asset. Venture into areas which does not attract the major producers holds out prospects, if with better management and market effort. One maxim which applies to the smaller producers is "to stick to what they know and do best".

Spending for the environmental control levels prescribed has been soaring through the years and is a burden which has to be provided. But economic growth needs chemicals and every country is anxious to ensure that the sources are not destroyed. The chemical producers and their associations are far more anxious to present an image of responsible activity and buttress their credibility with the public. Chemical industry has a wider appreciation of their role in society and not treat it as just a source of profits. The protection of environment is seen as a challenge and wil be tackled adequately to create public confidence. The fear and tendency to exaggerate by sections of the public are being countered to improve the chemical industry's image.

Nations urged to limit "Greenhouse" gases

Environment Protection Agency - EPA - has prepared a dy for the US Congress on the need to limit the build up greenhouse gases if the earth's climate is to be stabilised. icies ranging from fees on fossil fuels, preserving tropl forests would be steps in this direction if there is an interional and agreed programme. The EPA Report entitled olicy Options for Stabilising Global Climate", is the result the directives to EPA by the US Senate Committee on vironment and Public Works. The Report is the "best systatic effort ever put into what options are available but to be approved and accepted by the Senate Committee before wider publication.

The scientific community agrees that significant global warming caused by the "greenhouse" gas emissions will occur thereabout the next century. There are policy options available to significantly reduce the rate of emission and build up so as to slow down climate changes. The Worldwide energy usage is the primary problem and cause of global warming.

The contribution of different activities to global warming

is given as:

Energy use and production	57%
CFC's	17%
Agricultural practices (including methane emission from animals)	14%
Changes in land use including deforestation and biomass burning.	9%
Other industrial activities	3%

Some of the steps suggested by EPA are:

(a) Impose emission fees on fossil fuels such as oil, coal and natural gas so that their prices reflect on the risk of climate change -- such fees can promote shift in energy use.

(b) Require auto fuel efficiency to be raised to 50 miles per gallon from present 25 to 33 mpg.

(c) Cut in residential and commercial energy use by improvement of building designs and appliances.

(d) Step up research on non fossil fuel energy technologies -- solar, biomass, hydroelectric, geothermal, nuclear

(e) Phase out CFC's and halons -- 50% cutback agreed to at Montreal is not sufficient.

(f) Halt clearing of tropical forests and plant more trees.

(g) Encourage research into agricultural techniques, feed additives for cattle, water management in rice production.

(h) Policy to accelerate R&D on synthetic oil and gas production from coal.

All the above are very relevant to USA and the Western developed countries. The developing countries will face the impact of the climate changes as this is a transboundary and global phenomenon. But they cannot accept any cut down on use of fossil fuels and forego or cut down on growth. The per capita emissions from developing countries are too low in any case (See Table). But measures like the halt to deforestation and improved agricultural practices (including animal husbandry) are matters for urgent and positive efforts. It is rather unfortunate that Government of India has ignored the extensive submergence of forests through big dams such as on Narmada. The cattle population could be reduced over a short period through improved breeds giving larger per capita yields. The extensive water logging over large areas more particularly the water-flooding of the rice crop is considered as a source of significant methane emissions and this should certainly be studied. India's automobiles are far fewer but are run at lower efficiencies -- a situation which needs to be rectified urgently. We are not one of the culprit countries in CFC emissions and the production is too small.

There is need for international an effort on greenhouse gas emission before the situation reaches a point of no return in five or six decades on the present lines of development global warming is confirmed but their effects may st a matter for conjecture but no chances can be taken o possibility of coastal flooding over vast areas. In fact are views that the build up of CO_2 in the atmosphe being underestimated as the rise between 1987 and 198 higher than expected -- 2.5 ppm. as against expected 1.5

Apart from the "greenhouse" gases EPA estimates t million tonnes of toxic chemicals are released into th annually of which one third comes from chemical indu The magnitude of the problem is far greater than what assumed (See Table). There are moves to bring more trol on emissions soon. It is believed that incidence of ca is higher than average near chemical facilities and also health problems. The emissions by other industry sector very small in relation to chemical sector. If the emissions Rubber and Plastics and Paper industry are added the is nearly half of all toxic gaseous emissions. Of indivi chemicals one is phosgene, 69,000 lbs -- from just one perhaps, accidentally. More data is being collected as a number of factories do not seem to have given the comp details.

While international efforts are required on the contro gaseous emissions that affect global climate, the toxic g ous emissions require control by the countries themsel

Concentrations, Lifetime of greenhouse gases

	Atm. concn- ppm (vol.)	Atm. lifeti
Carbon dioxide	350	500 years
Ozone	0.02-10	a few hour
Methane	1.7	7 - 10 yea
Nitrous oxide	0.31	150 years
CFC 11	$2.2 \times 10^{(-4)}$	75 years
CFC 12	$3.8 \times 10^{(-4)}$	110 years

Per capita CO_2 emissions (1986)

East Germany	5.5 tons of carbon
USA	5.0 "
Czechoslovakia	4.2 "
Canada	4.1 "
Australia	3.8 "
USSR	3.5 "
Poland	3.2 "
West Germany	3.0 "
UK	3.0 "
South Africa	2.8 "
France	1.6 "
South Korea	1.1 "
Japan	2.1 "
India	0.25 "

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MRL-Chevron pact signed for lube additives plant

Madras Refineries Ltd. (MRL) has signed a joint venture agreement with Chevron Chemical Company of the US for setting up a lube additives plant.

The agreement envisages incorporation of a new company, namely, Indian Additives Ltd., to implement the Rs. 18-crore project at Manali near Madras. The company will have an initial paid-up share capital of Rs. 5 crores, out of a total authorised capital of Rs. 20 crores.

MRL will hold 60 per cent of the shares in Indian Adhesives Ltd. and the balance 40 per cent will be taken up by Chevron. The plant is slated to be commissioned by the end of 1991.

The agreement was signed at Madras on May 24 by Mr. V.R. Deenadayalu, Chairman and Managing Director of MRL, and Mr. R.W. Davis, President of Chevron Chemical Company. Top executives of both the companies and officials of the US Consulate General were present.

Speaking on the occasion, Mr. Deenadayalu said the new company will manufacture and sell additive components and packages under licence from Chevron Research Company, an affiliate of Chevron Chemical Company. Accordingly, it will enter into necessary licence agreements for the technology, apart from engineering services, trademark, supply and standing agreements.

The lube additives project will be implemented in two phases. In the first phase, targeted to be completed in two years, production facilities for 3,000 tonnes of calcium phenates and 6,300 tonnes of succinimides per annum will be established.

The second phase, due to be completed in two years, envisages setting up of manufacturing facilities for 4,500 tonnes per annum of calcium sulphonates. The company has plans to manufacture PIBSA, an intermediate in the succinimide process, during this phase.

According to the agreement, the new company will take up export sales programme and sale of lubricating oil additives in the country.

The new plant is expected to help save foreign exchange to the tune of Rs. 8 crores a year in the first phase.

Mr. R.W. Davis said the agreement was built on mutual respect and benefit. He assured that the requirements of the customers will be fully met by the company's products.

KEROSENE, HSD FROM NATURAL GAS

Bharat Petroleum Corporation Limited is setting up a Rs. 6-crore pilot plant for conversion of natural gas into kerosene and high speed diesel (HSD). The development of the process, done at the National Chemical Laboratory, Pune, is regarded as a major step-forward in self-reliance at the hitech level.

The pilot plant, funded by the Centre for High Technology, is being set upp as a tripartite venture between BPCL, NCL and Davy Power Limited and would manufacture one tonne of middle distillates (kerosene and HSD) a day from natural gas in order to test the commercial viability of the new technology.

Though the technology is expensive and certainly not cost-effective at the present juncture, its significance may become pronounced in times of oil price rise or if India finds it difficult to identify more oil sources. All over the world, the oil reserves are depleting fast whereas new free natural gas reserves are being discovered which are expecte last longer than crude oil. About 90 n lion cubic metres per day of natural will be available in India by the end the century.

It is estimated that even after accou ing for the proposed fertiliser plants, surplus natural gas available will equivalent to about 20 million me tonnes of crude oil per annum. T research on the process was carried under the overall direction of Mr. L Doraiswamy, NCL Director, and DPGL provided the necessary engi ering and designing expertise. The pi plant would be commissioned after t years, BPCL chairman and managi director R.K. Gajree told newsmen Bombay on May 23.

As part of efforts to reduce forei exchange outgo, India would be in position to utilise this large reserve natural gas. BPCL had the necessa experience and expertise in setting the plant at the refinery. Mr. Dora wamy, while announcing the ma breakthrough, observed that the cost producing methanol was prohibiti Producing methanol is the first step which the natural gas is converted synthesis gas to crude methanol.

In the second step, methanol is co verted into olefins which is then co verted into kerosene and HSD. Th conversion is carried out by using a ca alyst developed indigenously.

The catalyst, Encilite-5, research and developed at NCL, yields 85% olefins from methanol compared wi 70% obtained from the MOBIL proces NCL has also developed a catalyst f conversion of olefins into kerosene a diesel and tested it on a bench scale. A the three stages have been proved in t bench scale level using commerci batch catalyst and data for the design the pilot plant have been collected. Th technology developed by NCL is t only one which caters to specific nee of India.

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O.P. KHARBANDA

FRANKLY SPEAKING

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The Competitive Strategy

America has been steadily losing its competitive edge not only to Japan but also to many other countries with lower cost structure and better productivity. We bring you here two recent articles from the literature, first one dealing specifically with the threat from Japan in respect of pharmaceuticals and the other a broader one to indicate how America could possibly meet this challenge and threat. In the first one, Joel Dreyfuss (JAPAN'S PUSH IN PHARMACEUTICALS, Fortune, July 20 1987 page 85-6) tells how yet another Japanese industry, small by world standards, is pushing its way into the world with its new and cheaper innovative products. In 1986, Japan sold a mere 3% of its pharmaceuticals production abroad and had a $320 million trade deficit with the US in these products during the last year, but its postures are threatening and a serious challenge lies ahead. So much so that the names Takeda, Otsuka and Yamanouchi in the drug field, hardly known outside Japan, may become as familiar as Toyota and Sony. Also with their traditional lead in the field of biotechnology, Japan may soon have the 'miracle' drugs to treat cancer, osteoporosis and Alzheimer's disease. Japan has to push hard in the international market despite its large domestic base (nearly $20 billion, second in the world after US), because of a substantial 40% cut in the country's national health insurance plan. Apart from pushing the sales of their products abroad, the Japanese companies are also opting for joint ventures instead of the licensing agreements under which the Japanese manufactured drugs are being marketed abroad by the licensor firms. Their handicap is two fold. Firstly they are small by world standards, e.g., Japan's largest, Takeda Chemical Industries (sales: $2.5 billion) is about the same size as the 11th largest US company, Squibb. Secondly because of their lower profits (Takeda's profits of $104 million in 1986 are about one-fourth of Squibb's), the funds available for R & D are rather limited. Also they do not have the long R & D tradition of their American and West European counterparts. To make up for this, the Japanese companies are earmarking 10% of their revenues for research, similar to the figure for their American competitors. Although somewhat poor in research, Japanese are past masters in translating the scientific findings of their [illegible] to marketable products. As a result, Japan's share of new drugs patented round the world has jumped from a mere 1% in 1973 to 20% in 1983. Many of these are in the export pipeline. For an effective marketing thrust, need a range of drugs for export and they may soon r this stage. The formulae which worked for cars and elect ics may work for drugs too. In the second article, Prof. W ham Skinner, an authority on 'focussed factories' has dev a prescription (A STRATEGY FOR COMPETITIVE M UFACTURING, Management Review August 1987, p 54-56) for putting the American industry in general bac its feet by regaining the competitive edge it once ha proper manufacturing strategy is offered as the answer for this to be operative in early 90's, it must be put into p NOW since it requires considerable integration among various departments of a company. Why? The answer is vided by the president of Copeland Corporation, a re erator compressor manufacturer:

> I've suddenly realised that manufacturing requires pro bably the greatest intellectual competence, because deals with technology, people, market, strategy, invest ments -- every niche and corner of the company, short term, long-term, and operational.

And the competition is not from Japan alone. There is alre a long list of aggressive exporters each desiring a nich the large American market, and the list may soon include countries such as China, India and perhaps Africa. Ame faulted in ignoring the most vital area of manufacturing even believed Prof. Galbraith who said in 1958 that Am ica's productivity problems are over. The answer now is fo in going back to the shopfloor to turn things around, impr quality, speed up product development and increase cap investment. The ancient accounting systems based on 20-3 direct labour component need to be changed completely r that this element is less than 10%. Also much more inte tion is required amidst personnel people being afraid increase in productivity may lead to labour problems, eng ering and marketing managers operating completely in pendent of manufacturing. Then too, the neces infrastructures, control mechanisms and performance m sures must be provided and the managers must be retra in new technology and techniques. Improvement in 9 areas is essential to meet the competition: productivity; q ity; human resources management; new factory technol operations control and materials management; new produ organisational changes and manufacturing strategy. And t must be tackled NOW if we are to see the results in tw five years.

Dr. Eberhardt, a Fellow of the Institution of Chemical Engineers, is a [illegible] author of a book title: CAPITAL COST ESTIMATION FOR THE PROCESS INDUSTRIES with E.A. Stallworthy (Butterworth end-1988)

Pact with USSR on drug technologies

India and the Soviet Union have ed on a barter exchange of the latest nologies in the field of drugs and rmaceuticals.

The Soviet Research Institute of tibiotics and Indian Drugs and Phar- ceuticals Ltd. (IDPL) signed a spe- l agreement in Moscow on mutual -operation in scientific research in nicillin, rifampicin, cephalosporins d antracyclines.

The co-operation will include tech- logy sharing in producing strains, bio- nthesis, isolation and purification, nzymatic manufacture of 6-APA, pro- uction of 7-ACA and 7-ADCA, semi- nthetic derivatives as well as raw aterials for bio-synthesis and chemi- al transformation of all these bulk rugs from the basic stage.

One of the basic advantages for India would be that the know-how of some of the most sophisticated drug formu- ations would be available without any payment involved. Some of these are not available from other sources even on payment of technology fees. For example, the know-how for rifampicin was settled for an amount of Rs. 3 crores but the drug multinational backed out at the last minute.

The inroads into the Soviet Union not only marks a quantum jump in technol- ogy absorption in the pharmaceutical field but also throws open a vast market for drugs exports as well as joint ven- tures. The Secretary in the Department of Chemicals and Petrochemicals, Mr. M.S. Gill, who had recently led a high-level delegation of the manufactur- ers of drugs and pharmaceuticals to the Soviet Union, told newsmen that in view of the vast potential of the Soviet market, the export target of Rs. 200 crores fixed for the current year would be well within reach.

The delegation, 57 members in all with wide representation from the drug industry, attended a seminar organised by the Indo-Soviet Chamber and later signed a protocol. Mr. Gill said the delegation members, particularly those from the industry, also had one-to-one discussions with their Soviet counterparts and identified products and parties for joint ventures in drugs and pharmaceuticals.

In addition, protocols and intents concerning cooperation were separately signed with their counterparts by several Indian companies. He said the agreement between IDPL and the Soviets included exchange of technology, passing over the sale of strains, technologies, devices and facilities, raw materials and information.

The IDPL Chairman, Mr. K. Venkataraman, who was also present said there is no payment involved as the agreement envisaged exchange of technology. While the Soviets would give IDPL rifampicin production technology, IDPL would in turn provide penicillin-G technology.

He said the rifampicin technology would enable the country to produce the drug from the initial stage with little modification of IDPL plant at Rishikesh and the production would begin within two years.

Mr. Venkataraman said similar agreements in vitamins are also possible now as IDPL had the technology for vitamin B 1 and B 6, while the Soviets could provide vitamin A, E and B technology to India.

Mr. S. Agarwala of the Organisation of Pharmaceutical Producers of India, said there is a tremendous potential for Indian drug companies in the Soviet market.

Mr. Gill said that in view of the good response to the delegation (pharmaceuticals, chemicals and pesticides), he would visit the Soviet Union later this year.

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8TH PLAN TERMINAL YEAR

47-50 m.t. crude output likely

Crude production in the country is expected to be between 47 and 50 million tonnes in the terminal year of the Eighth Plan against 34.50 million tonnes in the current year.

Addressing the three-day conference of Economic Editors at New Delhi on May 24, Mr. Brahm Dutt, Minister of State for Petroleum and Natural Gas, said the consumption of petroleum products in the country was about 49.56 million tonnes during 1988-89.

The demand, for petroleum products, he said, was growing at a rate of seven to eight per cent per annum. Such high growth in demand has implications both in terms of higher investments needed for domestic oil exploration and production as well as increased outgo of foreign exchange for the import of oil and its products.

Mr. Dutt said the upward trend in oil prices in the global market will push up India's oil import bill. As a result of the quota arrangements of OPEC coupled with a reduction in supply from the UK's North Sea due to accidents etc., he said there has been a tightening of the international oil market of late resulting in an upward push in prices. This trend will eliminate the relief available on account of low oil prices to India.

The refinery throughput, the Minister further said, has also increased to 48.80 million tonnes in 1988-89 against a very low throughput of six million tonnes in 1960-61. Refineries in the country were running at "full capacity" despite some problems of crude availability in the north-eastern region.

The installed capacity of the refineries has gone up to 49.85 million tonnes per annum as on April 1, this year.

As demand for middle distillates is comparatively high in the country, the Government policy has been to augment the production through modification/addition of facilities in existing refineries. The refining capacity is also being increased by establishing new refineries, Mr. Dutt added.

Intensification of exploration efforts, accelerated production of oil and gas, improved energy management, wider use of natural gas and improvement of the refining and marketing infrastructure are some of the areas, the Minister said which would get special attention in the next Plan now under formulation.

NEW PIPELINE AT BPT

Aimed at improving oil hand facilities at marine oil terminal (M of the Bombay Port Trust (BPT) a 36" diameter oil pipeline at a cos Rs. 170 lakhs for import of crude was commissioned on May 23. pipeline, which was laid between j No. 4 and the manifold of MOT, wo not only facilitate imports of crude but also exports of surplus Bom High crude. According to BPT pr release with the commissioning of new pipeline, oil industry can expec save about Rs. 132 lakhs per annum account of reduction in the movem of empty tankers from jetty Nos. 1 and 3 to jetty No. 4.

USSR PURCHASES PHARMACEUTICALS FROM INDIA

The Soviet Union has bought Rs. crores worth of medicines and medic raw materials from India, Mr. M.S. G secretary, department of chemicals a petrochemicals, has said. Moscow r cently held an exhibition-cum-semin "USSR-India: cooperation in medic industry and development of pharm ceuticals", sponsored by the USSR m nistry of the medical and microbiolog cal industry, the Indo-Soviet Chamb of Commerce & Industry, & the USS Chamber of Commerce and Industr

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Integrated plan for Gandhar to raise oil output

Oil and Natural Gas Commission (ONGC) is drawing up an integrated plan for the Gandhar oilfield in the Cambay basin of Gujarat with a view to raising the oil production to three million tonnes annually and that of gas to 10 million cubic metres per day by the terminal year of the Eighth Plan.

The Gandhar field is presently producing about 2000 tonnes per day of oil and 1.5 million cubic metres of gas per day. The Gandhar field discovered in March 1984 has been on production since May, 1986.

In view of the vital necessity to develop this promising field at an accelerated pace the Government plans to take up the entire development of the Gandhar in one stroke. The Secretary in the Ministry of Petroleum and Natural Gas has informed ONGC that the Government was in favour of reducing the delays on account of clearances and was considering to take up the development of the Gandhar field bound only by the investments on the one hand and the results in terms of broad parameters of drilling and production on the other hand.

It is felt that such a mechanism would help in avoiding the cost and time overruns and provide the desired flexibility in diverting the resources optimally within the field.

The phase-I development programme of Gandhar had envisaged a production of 0.64 million tonnes per annum and 16.26 lakh cubic metres of gas per day by June, 1991. But already the field has been producing about 0.8 million tonnes per annum of oil and 1.5 million cubic metres of gas per day.

In the first phase, 36 development wells are to be drilled. The other related facilities like oil and gas pipelines would also be added to match the production potential of the field. A self contained liquefied petroleum gas (LPG) plant at Gandhar is also being planned in order to extract the LPG component from the rich gas.

The production of LPG is expected to be about 60,000 tonnes per annum (TPA) and NGL about 5000 TPA by October, 1990., The total capital cost for the development of phase-I is Rs. 326.68 crores.

Presently 10 rigs have been deployed in the area which is expected to increase to 33 by 1994-95. So far 53 wells have been drilled which in turn are expected to increase to 83 during the year 1994-95 alone.

A 12-inch diameter pipeline for carrying crude oil to the Gujarat Refinery at Baroda has been commissioned. The supply of gas to the various industrial and power consuming units in south Gujarat has been started with the commissioning of gas pipeline from Gandhar.

The supply of gas alongwith oil production has been done with a view to optimise the utilisation of gas as well as to develop the facilities in an integrated manner.

This four-km gas pipeline commissioned in August 1988, connects the Gandhar field to the main Ankleshwar-Baroda gas line. The latter is the main artery for supply of gas to such major consumers as the Gujarat State Fertiliser Corporation, Gujarat State Electricity Board, Baroda Municipal Corporation and various industries engaged in manufacturing textiles, ceramics and petrochemicals.

More than half million cubic metres of gas is being supplied from Gandhar. As a result of commissioning of this pipeline some consumers in Gujarat dependent on gas from Bombay High could be supplied the gas.

The economy of the Gujarat State has to a considerable extent been benefited due to the availability and use of natural gas supplied from ONGC. The total quantity of gas being supplied to various consumers including units in the industrial, power, fertiliser, dairy and pharmaceutical and textile sector in north and south Gujarat is to the extent of about 2.4 million cubic metre day.

In order to meet the requiremen the Gujarat Industrial Power Com at Baroda, Dhuwaran and Utran p stations of the Gujarat Electricity B ONGC has committed to supply a 1.6 million cubic metres of additi gas per day. This will be primarily through the further development o Gandhar field in the next two years. peak availability from the Gandhar is expected to be about five mi cubic metres per day which is a more than double the present rat supply from all the fields in Guja

The Gandhar field is located abou kms. south west of Baroda and entire belt comprises two sectors. first sector includes the main Gan field and the Dahej, Pakhajan, An Golsadra and Jambusar fields. sector two consists of the Nada fie Gulf of Cambay, Shoal area, Ma and south gulf areas. This entire be considered to be a highly potential for exploration and subsequent de opment activities.

The prognosticated resources of entire belt are about 466 million ton out of which about 195 million ton of oil and oil equivalent of gas h been proved so far.

MANGALORE REFINERY REPORT TO BE PROCESSED QUICKLY

Union minister of state for petrole Brahm Dutt has assured Karnat Congress leader Mr. Veerappa Mo that the project report on Mangalore refinery and petrochemical plant wil processed early.

In a letter to Mr. Moily dated M 10, he said that the petroleum mini had received a detailed project re and was processing it. The reductio the capacity from 6 million tonnes annum to 3 MTPA was done keep in view the regional petroleum prod supply demand and to avoid ha investment. However, there was s for expansion.

CHEMEXCIL exports exceed targets

he export of chemicals, pharmaceut- and cosmetics in 1988-89 touched cord figure of Rs. 1,247 crores sur- ing the target of Rs. 1,200 crores d by the Basic Chemicals, Pharma- icals and Cosmetics Export Promo- Council for the same year.

The export of these products during 8-89 recorded a growth rate of 59 cent over the previous year. In 7-88 the export of chemicals, phar- ceuticals and cosmetics was only 783.37 crores.

Two important groups of items nely basic drugs and formulations l dyes and dyes intermediates were inly responsible for such quantum np in exports in 1988-89.

Export of basic drugs and formula- ns registered a growh of over 75 per nt at Rs. 400 crores in 1988-89 from level of Rs. 222.8 crores achieved the previous year.

Dyes and dyes intermediates export nt up by 87 per cent at Rs. 401.60 ores in 1988-89. The export of these ms was only Rs. 214 crores in 87-88.

Another group of items which corded a 62 per cent growth rate ring 1988-89 was inorganic and ganic chemicals. The export of these ms was only Rs. 214 crores in 87-88.

Another group of items which corded a 62 per cent growth rate ring 1988-89 was inorganic and ganic chemicals. The export of these ms in 1988-89 grew to Rs. 149.41 ores from Rs. 92.17 crores in the pre- ous year. A similar increase in the port of soaps, detergents and toiletries uring 1988-89 was recorded. Their ports touched Rs. 140 crores in 988-89 as against an export of s. 85.57 crores in the previous year.

The growth in the export of items like agarbattis and essential oils was however marginal.

On the other hand there has been a drop in the export of items like opium, psyllium husk and crude drugs. The export of these products fell to Rs. 61.24 crores during 1988-89 from Rs. 77.36 crores in the previous year.

The council has now been assigned the challenging task of doubling the export turnover. However most exporters feel that the chemical, pharmaceutical and toiletry industries cannot double their export turnover in the next financial year unless fresh capacities are created quickly.

The exporters have submitted a detailed list of machinery and equipment whose duty-free import will go a long way in boosting exports. Speedy import of second-hand plants and machinery has also been mooted.

UNIVERSAL OLEORESINS

Universal Oleoresins, Cochin, has launched a new product called Spice Drop, which, according to the managing partner of the company, Mr. Anil J. Shah, is unique in the sense that it is the first time that a spice has been made available to the housewife in a liquid concentrate form.

Briefing newsmen at Bangalore on May 17 after the launch of the product, Mr. Shah stated that the initial response had been good and that he expected a turnover of around Rs. 2.5 crores in the first year from sales in the domestic and international markets and his firm was exporting oleoresins to leading food beverage and condiment companies like British Pepper and McCormick. The product, he said, was based on a technology developed by the Central Food Technologial Research Institute, Mysore, and commercialised inhouse after 18 months of testing.

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Parekh group to manufacture VAM

Vinyl Chemicals (India) Ltd. (VCIL) will herald the entry of the Parekh Group, makers of Fevicol brand adhesives, into the petrochemicals field with its plan to manufacture Vinyl Acetate Monomer (VAM) and other chemicals.

VCIL is entering the capital market on June 27, with a public issue of 50,00,000 equity shares of Rs. 10 each, for cash at par, to finance part of the cost of its project. VCIL is setting up the new plant for the manufacture of VAM with an installed capacity of 10,000 tonnes per annum at the MIDC Mahad, in Raigad district of Maharashtra.

VAM is a versatile chemical, used in the manufacture of polyvinyl acetate, polyvinyl alcohol, ethylene vinyl acetate co-polymers, vinyl acrylic co-polymers, acrylic fibres etc. VAM is at present manufactured in India by Polychem, and Vam Organic Chemicals Ltd. from ethyl alcohol. VCIL will be the first company to manufacture of VAM directly from ethylene. The company has entered into a foreign collaboration agreement with Uhde GmbH, West Germany, which is a subsidiary of Hoechst, West Germany. Uhde has set up a number of VAM plants all over the world on the basis of the same process technology.

The Parekh Group's turnover for the year ended March 1989 is over Rs. 85 crores and is expected to cross Rs. 100-crore mark in the near future. Parekh Group companies are one of the largest users of VAM, which is a basic raw material for manufacture of Fevicol adhesives and other allied products.

VCIL is implementing the project in a Central and State notified backward areas, eligible for concessional finance and backward area benefits. The new company is also eligible for substantial sales tax benefits as a pioneer unit, during the first nine years of its operation. According to Mr. M.B. Parekh, Managing Director of VCIL, cons tion of plant and non-plant build was in progress. All major equip such as reactor, columns, vessels package units such as boiler, coo tower, transformer, air compre MCC distributed control system, had been ordered.

Delivery of equipment, piping ma ial etc. was expected to start in J 1989. Structural and site fabric tanks work at site had started. Proc tion is expected by March 19 Demand for VAM is expected to gr regularly in the coming years. Mo over, the companies of Parekh Gr are one of the largest consumers VAM in India. Demand for VAM 1991 is expected at 39,000 tonn Parekh Group, which is the mar leader in adhesives, has a well diver fied product line catering to industr like furniture and woodwork, footwe leather goods, textiles, paints, pap printing inks, plastics, rubber, autom biles, defence, electronics etc.

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Colour code for drug container labels mooted

The Union Ministry of Health and Family Welfare has proposed to introduce a colour code for drug container labels.

The Government has sought to lay down that "the label of the inner-most container of any drug and every other covering in which the container is packed shall bear conspicuous vertical lines printed in red or orange or green colour running throughout the body of the label without disturbing other conditions printed on the label under the Drugs and Cosmetics Rules, 1945".

A gazette notification issued by the Government inviting suggestions/objections from the public to the draft rules regarding the colour code has stipulated red colour for narcotic analgesics, hypnotics, tranquilizers, sedatives, corticosteroids, anti-cancer drugs, anti-depressants, anti-coagulants, cortico steroids, hormones, anti-microbials, anti-epileptics, hypoglycemics, and all other drugs falling under schedule G and schedule X.

Incidentally, schedule G covers drugs which are required to bear a cautionary note to the effect that the drug should be taken only under medical supervision, while schedule X comprises psychotropic drugs.

Orange is for all classes of drugs in schedule H not covered by red. Schedule H comprises prescription drugs.

All classes of drugs not covered by red or orange will come under green.

When contacted, a couple of major drug producers in Bombay said that they are not against the Government's proposal, although its implementation may cause a considerable loss to the industry as the existing stock of blocks and labels would be rendered useless.

POLLUTION CONTROL: CLOSURE NOTICE SERVED ON 30 UNITS IN AP

The revenue divisional officer of Ranga Reddy district has served notices of immediate closure to 30 units in the Patancheru industrial estate near Hyderabad in keeping with the commitment made by the Andhra Pradesh chief minister, Mr. N.T. Rama Rao, in the state assembly a few months ago that stern measures would be initiated to eradicate industrial pollution in the state within 90 days.

Taken entirely by surprise, the Patacheru Industries Association has sought the intervention of the chief minister in preventing the immediate closure of the units. Further, the association has announced the formation of a joint stock company called Patancheru Enviro Tech Ltd. with an authorised capital of Rs. 1.5 crores to set up a second common effluent treatment plant for a group of 30 chemical, drug and pharmaceutical units in and around Patancheru within the next 12 months.

According to the association, industrial units which had initiated work on individual effluent treatment plants had suspended the projects in order to pool their resources for the construction of a common plant. Members of the company have been asked to contribute about Rs. 25 lakhs each towards equity to fund the common effluent treatment plant project.

LALBHAI GROUP TO SET UP MPB PLANT

Kasturbhai Lalbhai group is putting up a new plant at Ankleshwar in Gujarat for the manufacture of meta phenoxy benzaldehyde (MPB) with 300 tpa capacity. To be implemented by the Gujarat Aromatics Limited of the group, the project will have an investment of Rs. 2 crores which will be met through internal accruals -- Rs. 70 lakhs and borrowings from financial institutions Rs. 130 lakhs.

MPB is an intermediate chemical for manufacture of synthetic pyrethroid and the technology to be used by the company in the new project is indigenous being provided by the Regional Research Laboratory at Hyderabad. The company proposes to make use of meta-cresol which it already produces for the production of the proposed MPB. The present production of MPB is stated to be inadequate in the country and according to the company its demand is increasing. The company has been asked by the government to ensure that adequate safety and anti-pollution measures are taken and to take a certificate from state pollution control board to the effect that the project met the environmental requirements.

OBITUARY

We regret to learn the sudden demise of Mr. Rasiklal Amritlal Doshi, Chairman of M/s. Amritlal Chemaux Ltd., on 17th May at Bombay. He was sixty-five. Mr. Doshi was a well-known figure in the chemicals and dyes fields for over four decades. May his soul rest in peace.

KERALA TANKER STIR WITHDRAWN

The five-day-old strike by the Kerala Tanker Lorry Owners Association demanding increase in vehicle hire charges was called off on May 19, following a settlement reached between the Association and oil companies in Cochin. According to the understanding, a decision regarding the increase in charges should be taken soon and new contracts would be entered into in consultation with the association. The strike by the 600-odd private tanker lorries had hit distribution of petroleum products in several parts of the State.

IOL's liquefied gases new plant opened

The single largest liquid oxygen -nitrogen plant of Indian Oxygen Ltd. (IOL) in western India was inaugurated on May 22 by the Maharashtra Industry Minister, Mr. Ramrao Adik, at Tarapur.

The plant, which started trial production in February, is now in full commercial production for the last two months. Completed on schedule at a cost of about Rs. 25 crores, combining the latest technology, it is the second such air-separation plant in the country -- the first being the one at Jamshedpur set up in 1987.

The plant has incorporated sophisticated control systems to enhance its product quality. It has large storage tanks of 1,000 tonnes for liquid oxygen, and 700 tonnes for liquid nitrogen, besides a fleet of transport tankers of more than 8,000 litres capacity. Indian Oxygen Limited (IOL), which is a member of the worldwide BOC Group, has been a major supplier to Indian industry since over 50 years in two major sectors; (A) industrial and special gases; and (B) welding consumables and equipment.

In the field of industrial gases, IOL is the largest manufacturer in the merchant market of oxygen, nitrogen, argon and acetylene. The gases are used by a wide spectrum of industries, the important ones being engineering, metallurgical, chemicals and pharmaceuticals, glass and lamps.

Besides commercial grade industrial gases, IOL produces a wide range of special gases for specific applications in various industries and laboratories. These include high purity atmospheric gases, hydrogen and gas mixtures, which are marketed under the brand name of "IOLAR". IOL's special gases undergo a series of stringent tests and are guaranteed in respect of minimum level of impurities of various kinds.

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In addition to manufacturing marketing industrial and special g IOL is also one of the leaders in c genic plant technology. It manufact and supplies plants for manufactu atmospheric gases and acetylene, also provides projects engineering fa ities for installing and commissio these plants on turnkey basis. Th plants find a ready market among or nisations who want to manufacture market industrial gases in the merch market, as well as those who wish produce these gases for their capt consumption.

IOL presently has 12 gas manufact ing units at major industrial centres. O of the largest of such units was at Gh kopar in Bombay. The Tarapur tonna plant with a capacity producing tonnes per day of oxygen, nitrogen a argon and incorporating state-of-the-a technology is a replacement for t small gas plants which were located Bombay. The Tarapur plant has bee put up in response to the growin demand for industrial gases in weste region, particularly in greater Bomba and south Gujarat. This plant, whos entire output will be in the form o liquefied gases, will be able to meet th requirements of bulk process custom ers in the steel, chemical and pharma ceutical industries, as well as the oxyge requirements of small and large units i the engineering industry. In addition t the foregoing, it will cater to the increas ing requirements of medical oxygen i Maharashtra, in which field IOL is by far the largest supplier.

Industrial gases scene in India

The industrial gases industry in India has it origins as early as the mid-thirties, but it was not until the sixties that the industry saw acceleration in capacity growth in the merchant market. It the early post-Independence period, when large-scale steel and fertiliser plants we re put up, these industries set up their own captive air separation units (ASUs), leaving the conventional welding/cut-

g applications to the merchant market nufacturers. As a consequence, even lay the merchant industrial gases rket remains comparatively small, mprising less than 10 per cent of total cluding captive) industrial gases pacity in the country.

This is in sharp contrast to the scen-io prevailing in the developed coun-es of the West, as well as Japan, here the bulk requirements of atmos-eric gases by steel, chemicals and fer-iser units are mostly met by merchant arket manufacturers.

The industry was delicensed in 1985. ith this, there was an upsurge in pacity additions, albeit mostly at the nall capacity end of the industry. Thus, e Indian gases industry today compri-s a handful of medium/large capacity anufacturers, but over 200 small ma-ufacturing units in the country. The net sult of this has been a proliferation of nall, high pressure air separation plants nd geographical dispersion away from e main cities, where earlier plants had een located.

The smaller units still cater mostly to nventional cylinder gases business, nd the sudden increase in capacity ppears to have resulted in a temporary ismatch between supply and demand. owever, with continuing growth in emand, this is likely to balance out oon.

The larger units, with a capability of aking liquefied gases, have been rgely successful in extending use of xygen from the conventional welding/-utting applications to process uses. ven so, the industry continues to be riven by oxygen use, and with most of ne installed capacity being limited to mall, high-pressure ASUs, suffers from wo major disadvantages:

(i) almost all installations in the coun-y are high-pressure ASUs, which are xtremely power (energy) intensive, naking the product cost-ineffective for nany applications.

(ii) Unlike the western world and Japan, where nitrogen and argon (which are coproducts from the air separation plants) are in great demand, the Indian market is predominantly for oxygen. Thus, the cost base of the Indian industry is much higher, being covered only by oxygen instead of oxygen, nitrogen and argon.

A look at the consumption of ASU products clearly reflects the dominance of oxygen in the industrial gases applications. The share of nitrogen is only 16 per cent and clearly highlights the infancy of nitrogen applications in Indian industry.

In contrast, the gases industry in the developed countries are led by nitrogen and argon usage rather than oxygen. Oxygen applications have, however, progressed in the developed countries, as well as in India, well beyond the conventional welding/cutting usage to scrap preparation, enhancing rate of combustion applications in various metallurgical processes for manufacture of steel, copper and zinc, glass making, etc. New applications are still being developed. IOL is currently engaged in commercially introducing an oxygen-based process for treatment of waste water.

By contrast, application of nitrogen is still in a stage of relative infancy. It is true that nitrogen finds applications in a limited way in the chemicals and pharmaceutical industries, petrochemicals and in oil well stimulation. However, the vast potential for use of the inert and cryogenic properties of nitrogen remain untapped in applications such as food freezing, furnace atmosphere control, prevention of mine fires, electronics, etc.

It is to be hoped that with the recent thrust in food preservation/food processing industry, the market for liquid nitrogen in food freezing, chilling and transportation will develop at a pace similar to the more developed economies, thereby providing a fillip to the gases industry in India. Initial trials in individual quick freezing (IQF) applications for shrimps/prawns for the export market appear promising. The electronics industry also provides tremendous opportunities for use of high-purity nitrogen in the country.

Applications for argon in manufacture of special grades of steel and inert gas welding are rising rapidly. This, along with helium, other rare gases such as krypton, and speciality gas mixtures also provides tremendous growth opportunities for the Indian gases industry.

ASEB CLAIMS COMPENSATION FROM GAS CO.

The Assam State Electricity Board (ASEB) has claimed from the Assam Gas Company (AGC) compensation for loss of generation at the rate of 1.7 million units (MU) per day at the Namrup thermal power station (NTPS) due to failure to supply natural gas to NTPs since April 18 last.

An accident at the gas pipeline on April 18 forced NTPS to stop its operation resulting in a daily loss of about Rs. 16 lakhs by the power board, an ASEB release said recently.

AGC assured resumption of gas supply through the second pipeline subject to completion of work including hydraulic test but no definite date for commissioning the second pipeline was given.

The total loss of generation during the period from April 18 to May 11 alone at the rate of 1.7 mu per day was 40.8 mu, resulting in a staggering revenue loss of Rs. 375.36 lakhs to ASEB, the release said.

Consumers in the entire upper Assam region have been facing acute power shortage and very low voltage during peak-load hours, with industrial and commercial consumers being the worst sufferers, it contended.

Foreign firms for gold exploration likely

A major gold hunt is to begin in the country. With the Kolar Gold Fields, the only major gold mine in the country, at the stage of near exhaustion, the Govt. has, in principle, decided to invite foreign companies in gold exploration.

The franchise for gold exploration will more or less be on the same lines as for oil exploration with foreign companies bearing the full risk for failure and production sharing with the Indian participants in the joint venture. Already, two companies -- from Canada and Australia -- have bid for the gold adventure in India and their applications are at an advanced stage of approval.

The participation of foreign companies is being proposed for two reasons: firstly, the foreign companies have far superior methods and equipment for exploration. Secondly, it is stated that they have superior ore processing techniques which yield higher percentage of extracted gold metal from the ore.

The foreign collaboration in gold exploration is being sought in a desparate bid to step up production in the country. The production of gold has stagnated at less than one tonne per year while other recent entrants like Australia, Canada and even China have far outstripped India.

The rich Kolar Gold fields near Bangalore were first developed systematically by a British firm, Joyn Taylor and Sons, from 1880, even though there had been sporadic mining since the time of Tippu Sultan. The company was nationalised by the Mysore Government in 1956 and transferred to the Union Government in 1962. The public sector company, Bharat Gold Mines Ltd. was formed in 1972 taking over the entire operations of the Kolar gold mining.

BGML had ruled out expansion of mining operations at Kolar Gold fields as the mines have been totally exhausted. Only mining of peripheral areas has been taken up. The M Exploration Corporation of another public sector undertaking been conducting gold exploratio other areas like Chigargunta and B athan.

HPF MAGNETIC TAPES PLA OPENED

The Rs. 10-crore magnetic t plant of Hindustan Photo Films (HPF) was inaugurated at Udhagam dalam on May 19 by the Union Ind try Minister, Mr. J. Vengal Rao.

The plant, set up with the techni collaboration of Magna GmbH of W Germany, will manufacture magne tapes for audio, video and compu applications. It will have an annu capacity of 1,500 million runni metres.

Addressing a news conferenc Mr. P.R.S. Rao, Chairman and Mana ing Director, said the company's pr duction of magnetic tapes will meet part of the total demand of 12,000 mr a year in the country. Apart from HP nine private sector manufacturers hav also been licensed to make similar tape However, HPF will be the only com pany licensed to manufacture the enti range of magnetic tapes.

The total capacity of all the compa nies given licenses to make the tape will be around 14,000 a year. H claimed that the tapes produced by HP will be far superior in quality to th cheap imports now flooding the marke and will be a match to those from Ger many and Japan.

Besides, a significant feature of the formulations used is high recording/play -back performance coupled with reduced head-wear characteristics. HPF holds the technological lead in this par- ticular area, Mr. Rao pointed out. Mr Vengal Rao also inaugurated the new R & D centre of HPF set up with an investment of Rs. 3 crores.

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ASUREMENT SCIENCE

New Indo-US project underway

n a major new Indo-US cooperative ject in measurement science, scient- from the National Physical Labor- ry (NPL), New Delhi and the US tional Institute of Standards and chnology (NIST) will carry out inves- ations related to very accurate mea- rements of mass, voltage, length, time d frequency.

The Rs. 49-lakh collaborative search programme aims at developing phisticated physical measurement ethods of great value to scientific esearch and industry and commerce of oth countries.

"The accuracy of the measurements s astounding," Dr. Peter Heydemann, JS Embassy Science Counsellor said.

The three-year programme which is eing funded from the US-India Fund, vill support a range of meteorological tudies on standards of measurement.

Most countries use stainless steel standards of mass. The joint work will involve calibration of the stainless steel standards against platinum-iridium standards of mass. The study will standardise environmental conditions for maintaining the cleaning stainless steel mass standards and provide them with greater stability with time.

"Super-accurate weighing may not be important in the local market", Dr. Heydemann said, "but an error of one gram in each kilogram of oil imported into India is a very large amount".

It is also proposed to systematically study the characteristics of zener diodes with the aim of developing a simple technique for the establishment of electronic voltage standards of high stability.

"The proposed study on laser standards for length and frequency measurement will be a step towards setting up unified standards of length and time", he said. "It would involve establishment of techniques for stabilising the helium-neon/iodine laser as a standard of wavelength and frequency."

Another study will involve dissemination of time and frequency signals through satellites. Experiments conducted by India under this programme will determine the feasibility of the dissemination of time signals through satellites.

The data obtained will be compared with that of the US to determine the accuracy of the total time transfer technique and its stability. The study is likely to lead to improved time standards and time dissemination techniques.

The project is a culmination of long-standing co-operation between NIST and NPL, which are leading laboratories in the area of measurement science.

In what is seen as increasing environmental awareness, Indian industries are turning to scientists to decide on where and how to dispose of their wastes in the sea.

A number of industrial units off the Bombay coast have approached the regional centre of the National Institute of Oceanography (NIO) in Bombay, to suggest location and mode of disposal of wastewater so that impact on the environment is negligible.

Among the units that have turned to NIO include the Oil and Natural Gas Commission, Municipal Corporation of Greater Bombay, Indian Petrochemicals Limited, Rashtriya Chemicals and Fertilisers, Bhabha Atomic Research Centre, Gujarat Heavy Chemicals Limited and the Bombay Port Trust. According to Dr. M.D. Zingde, scientist-in-charge of the centre, the nearshore waters have always been looked upon as convenient recipients of pollutants.

"But, of late, general public awareness of hazards of pollution, in particular among industrial managers, has resulted in scientific studies along the coast to decide on sites for disposal of wastes, ensuring least damage to the ecology", he said.

Majority of the studies were done by the NIO centre which has a multi-disciplinary group of scientists to undertake investigations related to marine pollution and protection of the aquatic environment.

The studies involve collection of environmental data with respect to tides, currents, dispersion potential, tidal excursion and their seasonal variability, Dr. Zingde said.

Ocean experts collect samples of sea water to determine the existing quality and levels of various pollutants, besides undertaking experimental fishing to compare the fish landing data.

"The results of all these studies are utilised to suggest suitable mode and location for release of treated waste water so that there is no danger to environment" Dr. Zingde said.

Since the oceans cover more than 70 per cent of the earth's surface, a natural question among industrial managers is what possible harm could occur to the oceans since the waste released is only a drop in the bucket.

But scientists say the materials dumped in the oceans is not evenly spread throughout the oceanic volume and infinite dilution assumed by industries is only of theoretical interest. Often the waste is enclosed in semi-enclosed marginal seas, coastal waters and estuaries bordering thickly populated zones where the dilution factor is small.

Ecological clearance for new BPT berth

The Government has granted environmental clearance to the Bombay Port Trust to set up a new berth at Pir Pau to handle special grade petroleum products and liquid chemicals.

In granting permission, however, the Environment and Forests Ministry has stipulated conditions including installation of devices such as oil water separator, oil skimmer and oil monitor to remove all floatable materials including oil spills while handling the cargo.

The Ministry said in its order that to prevent discharge of sewage, bilge wastes and other liquid wastes into the marine environment, an adequate system must be provided for sewage collection, treatment and disposal including shoreline interceptor for receiving liquid wastes from all shoreline installations for ships to allow for discharge of sewage. Other conditions imposed on the Bombay Port Trust for the berth project include:

-- BPT must limit its activities in the Bombay dock complex to its existing facilities and any further changes should be considered only in terms of improving the efficiency of the port operations.

-- Adequate arrangements for infrastructural facilities such as water and power supply and fire fighting must be ensured for the port area.

-- No reclamation should be carried out by BPT without prior approval of the Maharashtra Environment Department and the Centre.

-- Periodic monitoring of the solid and liquid wastes must be ensured and BPT must carry out a study of air, water, solid waste disposal and marine environment to prepare an environment management plan which should be submitted to the Ministry within six months of its approval.

-- Development of the green belt must be carried out in accordance with the Bombay Port Trust's master plan. In addition, trees must be planted on both sides, along the existing and propo roads and other vacant spaces and al the shoreline.

-- The quality of treated effluents, s wastes, emissions and noise level m conform to the standards laid down the competent authorities including Central State Pollution Board and un the Environment (Protection) Act, 19 whichever are more stringent.

-- BPT must set up an environment u to monitor and implement the pr grammes related to pollution control a conservation.

-- Adequate funds must be earmarke for implementing the stipulations whic may be varied or new one impose under the Acts for preventing pollutio of air, water and environment.

The ministry's order also made clear that the environmental clearanc for the prospect could be revoked in th interest of environmental protection.

ENVIRONMENT DATA ERRONEOUS

Most of the data on environment i India are 'erroneous and unreliable', a environmentalist in Calcutta claims.

Dr. Dipankar Chakraborty, Join Director, School of Environmental Studies, Jadavpur University, and an international expert on environmental analytical chemistry said that the method of chemical analysis and the ways of sample collection, the two key points to assess the pollution conditon, were not done in a proper way.

Citing examples, the scientist said in most cases after collecting the samples, the analysis was done by an instrumental technique. The samples should be cross-analysed by a 2nd method which is 'not done in most cases'. A data was not reliable if it was not re-checked by a second technique, he said. To know whether the method applied for analysis was correct a standard sample of the same type should be analysed, he said.

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RL expansion: huge investments expected in downstream projects

The massive expansion-cum-versification programme to be taken by Cochin Refineries Ltd. (CRL) in e next five years at a cost of above s. 1,000 crore, will trigger almost an qual amount of investment in down-ream projects in Kerala.

According to KSIDC sources, in ddition to its Rs. 1,000-crore invest-ent plan, CRL itself has applied for icence to set up a Rs. 1,000-crore naph-ha cracker project and associated com-plex to be set up during the Eighth Plan.

The project, once started, will take ive years to complete and will provide employment to about 500 persons. However, other refineries and some pri-vate parties have also staked their claim for this prestigious project.

Mr. J. Jayaraman, Chairman and Managing Director, Cochin Refineries Ltd. said that the prospects for setting up downstream projects were plentiful. Already KSIDC and CRL have applied for licences to set up some of these pro-jects, estimated to cost Rs. 500 crore and which will provide employment to nearly 1,000 persons.

The downstream projects now planned are mainly for the manufacture of epichlorohydrin and purified tereph-thalic acid (PTA), used in polyester manufacture. CRL has also applied for licence to set up a 80,000-tonne per annum styrene-butadiene-rubber (SBR) project. The Rs. 420 crore project will utilise the raw material from CRL itself and provide employment to around 350 persons.

Among the other downstream pro-jects are LAB, caprolactum, phenol, DDT, styrene and nitrobenzene. With the company's toluene project going on stream in August this year, possibility will also be there for setting up down-stream units like paints and varnishes.

According to KSIDC sources some of these proposals have already received Plan entry. The Centre has already informed parties concerned that CRL's naphtha cracker project will be kept in view while finalising the Eighth Plan. Mr. Jayaraman said that CRL had plans to expand the processing capacity of its refinery from 4.5 million tonnes to six million tonnes of crude per annum. To begin with, the company will expand the capacity by 0.5 million tonnes, through modification of the existing unit on a very low-cost basis.

The total refinery expansion which will be phased out over five years, is expected to cost Rs. 200 crore, he said. Simultaneously with this capacity expansion project, CRL will also take up a fluid catalytic cracking unit (FCCU) at a cost of Rs. 164.98 crores.

The company plans to produce xylene and benzene in the second phase of its aromatic recovery units, which will be an expansion of the benzene pro-ject which has already been commis-sioned. Besides going in for additional benzene capacity of 79,000 tonnes a year, the company will also set up a xylene unit with a capacity of 2.52 lakh tonnes.

These two projects, estimated to cost Rs. 500 crores, will give employment to 200 persons, he said. The viability study for these projects is already on. The company also intends to go in for other petrochemicals like isobutylene, which will cost between Rs. 20 crores to Rs. 50 crores.

A Rs. 160-crore linear alkyl benzene (LAB) project has also found place in the company's diversification plans. CRL has applied for licence to set up a 25,000 tonne per annum butyl rubber project, estimated to cost Rs. 168 crores.

KERALA INDUSTRIALISATION: CENTRAL UNITS, KSIDC TO JOIN HANDS

The Central public sector undertak-ings in Kerala and the Kerala State Industrial Development Corporation (KSIDC) will form a consortium to ensure early clearance to their expan-sion cum diversification proposals and also help speed up the State's industri-alisation by prompt implementation of their proposed projects.

A decision to this effect had been taken at a high-level meeting held at the headquarters of Fertilisers and Chemi-cals Travancore Ltd. (FACT) Udyog-amandal, recently.

Chief executives of almost all major Central undertakings in the State and the State promotional agencies, besides experts in the petrochemical industry, attended the meeting.

It was decided that if required, the Central undertakings should jointly set up a new company for the implemen-tation of new projects. The undertakings to be involved in this new venture are mainly FACT, Cochin Refineries, Hin-dustan Oil Corporation and Indian Pet-rochemicals Corporation Limited.

Of these, FACT and Cochin Refin-eries have agreed to the proposal in principle as both are inter-dependent for raw materials, besides having many things in common. Other undertakings also have common interest and are keen to involve themselves in the exercise. The role of KSIDC will be a facilita-tive one, according to a State Govern-ment spokesman.

One major problem faced by the units in the fertiliser and petrochemical sec-tors of late has been that they have to approach different Central Ministries for a project clearance with the recent division of ministries.

Often under some lame excuse of raw material shortage or lack of infrastruc-ture, letter of intent or industrial licence is denied for expansion or diversifica-tion projects submitted by these Central undertakings in Kerala. This is sought to be avoided by joint lobbying and follow-up.

The main thrust is on petrochemical industries, in view of the bright oil pro-spects in Cochin offshore. Already the Central undertakings, particularly, FACT and Cochin Refineries have pro-posals for expansion and diversification to the tune of Rs. 2,500-3,000 crores during the Eighth Plan.

ABID HUSSAIN COMMITTEE

Cautious investment in petrochem urged

The Abid Hussain Committee on petrochemicals is understood to have suggested a cautious approach in setting up new petrochemical projects.

The high-level expert committee has recommended that considering the massive funds required to put up huge petrochemical complexes, greater stress should be laid on starting downstream projects.

It said downstream projects were less capital-intensive and more employment-oriented. Besides, the gestation period for downstream projects was much lower and these go on stream faster.

The Government set up the Abid Hussain Committee to draw up detailed plans for the petrochemicals sector in the Eighth Plan period (1990-95). In a letter to the Prime Minister, Mr. Hussain is reported to have suggested that preference be given to gas crackers rather than naphtha crackers.

Also, as a general rule, the Government should not put up all cracker complexes at the same time. It would be best to phase them optimally, the committee has said.

If the projects are taken up together, or in quick succession, there might be problems in procuring plant and machinery. Since there are not many manufacturers of these items, the prices may also be jacked up by the manufacturers.

Top priority is being given to the Uttar Pradesh Government's proposal to set up a petrochemical project at Auriaya, as that is regarded as the ideal location for basing a complex in the North. In the East, Vizag has been given priority because of the refinery there.

The Abid Hussain Committe also recommended the expansion Indian Petrochemical Corporation (IPCL) Baroda plant.

Assam has got one of the finest richest reserves but projects there held up for lack of finances.

Punjab also has staked a claim once the refinery there gets going would be easier to locate a plant th

BRPL ACHIEVES RECORD CRUDE THROUGHPUT

The Bongaigaon Refinery and Petchemicals Limited (BRPL) has set n records in crude throughput with 1 million tonnes of crude processed in refinery section during 1988-89.

A spokesman of the BRPL said th this throughput was 5.1 per cent high than the previous year.

With the turnover reaching Rs. 3 crores, BRPL earned a provisional assessed pre-tax profit of Rs. 23 cror he added.

With an investment of about Rs. 4 crores, BRPL was the first indigenou grass-root refinery in the country int grated with a petrochemical comple

The production of the petrochemica groups was 22 per cent higher than la year with the production of dimeth terephthalate (DMT), a raw material fo polyester staple fibre being 32,900 M the spokesman said.

With the commissioning of the po yester staple fibre plant, Bongaigao Refinery and Petrochemicals Ltd. woul produce at least 30,000 MT of versatil polyester fibre per annum, he added.

The company would intensify it efforts in various fields including energy conservation, operating efficiency and environmental improvement, the spokesman said.

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ROCHEM, PETROLEUM

Mergers of ministries under study

he Union government is understood ave revived the move to bring the ochemicals industry under the inistrative control of the ministry of roleum and natural gas. At present, petrochemicals industry is looked r by the department of chemicals l petrochemicals in the industry nistry.

This move was first initiated in Octo- r last year. It was then expected that e departmental restructuring would incide with the secretarial reshuffle. he secretarial changes did take place the first week of November 1988, but ie petrochemicals industry continued remain under the control of the indus- y ministry.

Apparently, the departmental reor- anisation was shelved as other consid- rations such as accommodating some enior bureaucrats came in the way. With a minor secretarial reshuffle on the ards now, the proposal to transfer the etrochemicals division to the petro- eum and natural gas ministry has once gain been receiving close attention of he government at the highest level.

It is not yet clear whether only the petrochemicals division would be shifted or the entire department of chemicals and petrochemicals would be transferred to the petroleum and natural gas ministry. According to one official source, the entire department may be shifted as the government has not yet named any minister of state for this department since the last incumbent, Mr. R.K. Jaichandra Singh, left in 1987-end to become the chief minister of Manipur.

This would mean that even the chemicals industry including pesticides and drugs would be shifted to the petroleum and natural gas ministry. However, this may not conform to the rationale of the proposed organisational restructuring. It is argued that petrochemicals is interlinked with the petroleum industry to such an extent that the two should be looked after by the same ministry for adminstrative ease and better coordination. By that criterion, the chemicals division should be retained in the industry ministry.

The department of chemicals and petrochemicals was created in October 1985 at the time of reshuffling the Union Cabinet. Prior to this the chemicals industry was under the adminstrative control of the ministry for fertilisers and chemicals. Petrochemicals was being looked after by the petroleum ministry.

The need for creating a separate department of chemicals and petrochemicals under the industry ministry was felt in view of the rapidly growing petrochemical industry and the government's plan to give added thrust to this sector. It was also argued that the chemicals industry is in some ways connected with the petrochemicals industry. Feedstocks of some chemical items can be petrochemicals also.

The first full-fledged secretary of the department of chemicals and petrochemicals, was Mr. H.K. Khan. He was shifted to the petroleum and natural gas ministry in November last. Mr. Khan was succeeded by Mr. M.S. Gill, who was till then the financial commissioner to the Punjab government and chairman of the Punjab Agro Industries Corporation. He is believed to have played a vital role in getting the government clearance to the Pepsico project in collaboration with Punjab Agro. The department has three divisions looking after the drugs industry, chemicals industry and petrochemicals industry. The petroleum and natural gas ministry, on the other hand, is a relatively small outfit with only one division looking after the petroleum and natural gas sector.

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KANDLA-BHATINDA PIPELINE PROJECT BID

Spie Capag, Snam team up

Spie Capag of France, Snam Progetti of Italy and Dodsal, an Indian firm, have formed a consortium to bid for the Kandla-Bhatinda pipeline project, to be undertaken by the Indian Oil Corporation (IOC).

With this, Spie Capag has dropped Toyo Engineering, its Japanese partner in the consortium that is now implementing the Hazira-Bijaipur-Jagdishpur (HBJ) gas pipeline project.

This also means that Spie Capag and Snam Progetti have decided not to compete with each other for the Kandla-Bhatinda pipeline on the ground that the Japanese company's expertise in pump stations is not of the same level as in compressors. Toyo was preferred for HBJ pipeline project, as this was to have compressors for regulating supplies of gas. But the Kandla-Bhatinda pipeline project will carry products and hence would require pumps instead. Thus Toyo has been dropped by Spie Capag, it is said.

The tie-up between Spie Capag and Snam Progetti is explained as an outcome of the two companies recognising their mutual needs. They have realised that by fighting a fierce battle over the HBJ gas pipeline project, they allowed the project authorities to have tough negotiations often to their disadvantage. Thus they are understood to have decided to put up a joint bid along with Dodsal.

Dodsal has also worked with Spie Capag as a sub-contractor for the HBJ gas pipeline project. It has been chosen as a consortium member as the French company is quite satisfied with its work.

According to sources, the combination of the three companies will make their bid for the Kandla-Bhatind line project -- perhaps the stron all the bids.

This is because apart from the lective strength both the French an ian companies have already got in with their respective governme back up their bids with attractive packages. Preliminary enquiries by these companies reveal that financial help would be forthcom

The 1,330 kilometres long pip project will be assisted by the W Bank also. But its loan of about do 340 million would not be adequa implement the project, the total co which would be over Rs. 700 cro

Thus IOC has indicated that com nies bidding for the project should b up their offers with financial packa either from their governments or fr international institutions on attrac terms.

IOC at present is finalising the ten documents, which would have to released to the companies that wan bid for the project. At another level is now busy evaluating the bids ma by various foreign companies for b ging the consultancy contract for project.

The companies in the fray for consultancy job include British G Bechtel and P.L. Technology of the U P.L. Engineering of West Germany a Nova Corporation of Canada. The co pany that bags the contract for imp menting the project would have to wo under the supervision of the chosen co sultant.

The pipeline would be the seco longest in the country after the HBJ g pipeline, whose length is 1,700 ki metres. Its carrying capacity is thr million tonnes of petroleum produc per annum on the Kandla-Kamal secti and 1.5 million tonnes of products p annum on the Kamal-Bhatinda sectio

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O-PRODUCTS

Marketing network to be revamped

Union government has decided vamp its marketing policy for eum products to ensure that there o distribution bottlenecks at the level.

e decision follows a detailed study e consumption pattern of the petro- products in the country and the lems in retail marketing.

o begin with, the petroleum and ral gas ministry has directed the or petroleum marketing companies the Indian Oil Corporation (IOC), rat Petroleum Corporation Limited CL) and Hindustan Petroleum Cor- ation Limited (HPCL) to evolve able schemes by which they could id retail-level problems in regard to ribution of petrol and diesel to the sportation sector.

t is proposed that these three marke- g companies should set up separate il outlets for two-wheelers. At pre- t, the petrol and diesel sale outlets the same for all kinds of vehicles.

The ministry has found out that the pulation of two-wheeler and three- eeler vehicles is growing at a much ter rate than that of four-wheelers like rs and commercial vehicles. But since e heavy vehicles and light vehicles are quired to get diesel or petrol from the me outlet, supply bottlenecks often ke place creating hardships for cus- mers.

Separate outlets for two-wheelers and ree-wheelers would also ensure that is segment of the market gets due portance and facilities. It is estimated at about 70 per cent of the transpor- tion sector is accounted for by two- heelers and three-wheelers. But the xisting facilities for them at the retail vel are not commensurate with the arket share they enjoy. Subsequent to e ministry's directive, consultations among the marketing departments of the three companies and the ministry have already begun. To ensure that the first phase of the marketing reorganisation is a success, it has been tentatively decided that the country should be divided into zones and each zone should be entrusted with one of the oil companies.

For instance, BPCL may be asked to take care of the northern region and HPCL may be asked to handle western region. IOC could take upon itself the responsibility of creating separate outlets for two-wheelers and three-wheelers in the eastern region. Such earmarking of zones to be developed by each company would enable the government to fix responsibilities on one company for the operation of the new scheme in one area.

According to official sources, creation of separate marketing outlets for two-wheelers and three-wheelers would entail marginal investments by the oil companies. At present, these calculations are being made. But there is a general consensus that the benefits to the customers would be substantial and would justify such expenditure.

The second phase of the marketing reorganisation is likely to be creation of additional port facilities to import Liquefied Petroleum Gas (LPG). At present, the country can import LPG only through Visakhapatnam and Bombay. While the former has constraints because of the Indian Navy's operations there, Bombay port is too congested to allow expeditious import of LPG.

Thus two more LPG import berths are proposed to be created -- one on the eastern coast and another on the western coast. The country plans to import three lakh tonnes of LPG during 1989-90 compared to about 2.7 lakh tonnes during 1988-89.

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Foreign participation in Bombay gas project likely

Foreign consortium as well as private sector houses are likely to participate in a massive Rs. 420 crore project of supplying natural gas to domestic, commercial and industrial consumers through an underground pipeline in Bombay.

At least 93 large commercial establishments would eventually get natural gas, also 21 large industries and 125 small units. Natural gas would be available to domestic consumers at a price equivalent to LPG cylinders. The price for industries has not yet been decided.

The Gas Authority of India Limited which has been awarded the contract by the Government of Maharashtra for distribution of natural gas had to compete with other bidders for the prestigious project.

As per the project implementation programme drawn out by the GAIL, the gas will be available on tap to first consumers by June 1991. Though the schedule is tight, the GAIL is confident of meeting the deadline and the experience of the HBJ pipeline project explains its upbeat mood.

These and other details were announced by Mr. H.K. Khan, secretary, petroleum and natural gas and Mr. Vineet Nayyar, chairman and managing director of GAIL. The GAIL has urged the Maharashtra government to participate in equity though the proposal has not been accepted by the state authorities as yet.

GAIL prepared the techno-economic feasibility study (TEFS) in April 1989 and made a detailed presentation to the secretary (petroleum and natural gas) to appraise him of the assistance required from the Central Government for the approval of the project. Looking into the importance of the project, Mr. H.K. Khan, had assured total support of his ministry and also persisted with the Government of Maharashtra to extend full support to the scheme for its speedy and successful implementation.

Greater Bombay Gas Supply System is the first major mega project of its kind in the country and in order to incorporate the state of art technology in distribution, GAIL tied up with Sofregaz, a division of 'Gas de France' as back-up consultants for preparation of TEFS and project report in November 1988.

GAIL assisted by Sofregaz, carried out detailed market and technical survey in order to assess the demand potential and requirement of infrastructure for supply of gas in domestic, commercial and industrial sectors in Bombay.

The main objective of the TEFS had been to assess the condition under which a modern natural gas distribution system could be economically built and operated with the parameter and constraints set by Maharashtra Government.

They are: supply of 1.5 mm of natural gas at a price equivalent to those of the fuel replaced such as LPG, furnace oil etc., economic and financial viability of gas distribution system.

The construction project would entail building a transmission line of 90 km of steel pipeline, a distribution grid of 2700 km of polyethylene piping and 1100 km of galvanised steel, which would connect the grid to individual households. About 10,000 labourers on contract will work on this project.

MORE SPONGE IRON UNITS TO GET GAS

The Union Ministry of Petroleum and Natural Gas has decided to allot about four million cubic metres of gas per day to the sponge iron plants in the country.

A meeting of Secretaries fro Ministries of Finance, Steel and and Planning was called by the M try of Petroleum and Natura recently to draw up a priority list f allocation of gas.

According to official sources, the dozen proposals pending wit Ministry, it will be possible to me requirements of only seven to applicants. A sponge iron plant between 0.50 million cubic metr 0.75 million cubic metres of natura daily.

The State-wise break-up of the p ing appliccations for gas for sponge plants is five from Andhra Prad three from Uttar Pradesh and two from Maharashtra and Tamil Nad

Indications are that gas will be a cated for one more unit in Maharas one or two in Uttar Pradesh and each in Andhra Pradesh and T Nadu.

The Ministry has so far allocated million cubic metres of gas to t sponge iron units. The plants set up Grasim in Maharashtra and anothe Hazira (a 100-per cent export proj have been promised 0.75 million cu metres of gas per day each.

The Essar group which has set u plant in collaboration with the Guj State Industrial Development Corpo tion has been allowed 0.50 million cu metres of gas per day.

Natural gas reserves in the cou have grown five-fold in the last years, exploratory efforts by Oil Natural Gas Commission (ONGC) Oil India Ltd. (OIL) have resulted in discovery of huge gas reserves Andhra Pradesh, Tripura, Guja Assam and Bombay Offshore.

Encouraging results have also b obtained in Rajasthan and Tamil Na

ONGC spuds first well in Mizoram

The Oil and Natural Gas Commission (ONGC) has spudded the first well in Mizoram. Rengte, the drilling site, is located about 20 km from Kolasib and about 75 km south of Silchar. A Russian rig, 3D-19, has been pressed into service. The targetted depth of the well is 3,000 metres. The prognosticated reserve in the state is estimated at 173 million tonnes.

Col. S.P. Wahi, chairman, ONGC said that two other locations in Mizoram had been identified for drilling which would be taken up soon. The thrust of ONGC's Eighth Plan programme, Col. Wahi indicated, would be on stepping up operations in the Cachar belt and Dhansiri valley in the north-east region. There are now 10 rigs operating in the north-east, five each at Cachar belt and Dhansiri valley. The plan is to double the number in each place in the next plan period.

ONGC, according to its chairman, has already struck gas at two places in the Cachar belt, namely, Adamtila and Banaskandi. At Adamtila, the present flow rate is 1.1 lakh cubic metres a day and at Banaskandi 40,000 cubic metres a day. Both these wells would be put under EPS (early production system) soon, he said.

At north Dhansiri valley, ONGC is already producing oil and the plan is to start production also in the southern part of the valley. Presently, drilling is progressing at Uriamghat in the central part of the valley.

At Tripura, ONGC is sitting on huge gas reserves as there are hardly any takers for it. The Tripura state electricity department is committed to lift a sizeable quantity of gas, but their offtake so far has been rather limited. Talks are on to set up gas-based power and methanol plants by the National Thermal Power Corporation (NTPC) and Rashtriya Chemicals and Fertilisers (RCF).

Investment on gas-based companies

Buffeted by low utilisation of natural gas and zero returns on massive investments made in funding gas reserves in Tripura and other parts of the country, the Oil and Natural Gas Commission (ONGC) is now open to participating in equity holding of gas-based industries.

Col. Wahi said the commission is currently having talks with the State Governments concerned and different industries on steps to ensure higher utilisation of natural gas.

Col. Wahi said ONGC has enough surplus funds to invest in equity participation. "For me, the sky is the limit", he said refusing to elaborate on the size of the funds.

Drilling at Harargaj near Dharamnager is to be taken up soon with the help of the BHEL rig, E-1400. The targetted depth of the well is 4500 metres.

So far, 30 wells have been drilled in Tripura in four structures, namely, Baramura, Rokhila, Gojalia and Agartala dome. A fifth structure, Tichha, is under drilling. During the Eighth Plan, ONGC plans to drill 128 exploratory and development wells in the state.

The chairman said the plan to raise oil production in the north-east would be seriously hampered in coming years unless there was matching increase in transportation and refining capacities in the region. The present transportation capacity is limited to 5.7 million tonnes and about 6 million tonnes for refining. In Assam, ONGC is currently producing a little over 3 million tonnes and OIL another couple of million tonnes.

Col. Wahi described West Bengal as the most complicated area as far as the exploration of hydrocarbons was concerned. "We have already spent several hundred crores of rupees in the state on exploration activities, though with little success so far. However, there is no question of slackening our effort in the state which is geologically considered a potential area," he observed.

A few months ago, ONGC invited several foreign and Indian experts to study the West Bengal situation. Presently the Russians are engaged in work prior to drilling at one location near Calcutta.

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Panel to boost oil output likely

The Union Government is actively considering a proposal to constitute an Empowered Committee of Secretaries of the Ministries of Petroleum, Economic Affairs, Expenditure and Planning, and Chairman of the Oil and Natural Gas Commission (ONGC) with high financial powers to give a fillip to oil exploration and production programmes during the Eighth Plan.

It has been suggested that the Empowered Committee be delegated full powers for all investment proposals beyond the powers of ONGC. The committee will also expedite the implementation of modifications in refining and other downstream industries for enabling the full utilisation of ONGC production.

According to official sources, the recommendations of the committee would be directly submitted to the Cabinet Committee on Economic Affairs (CCEA) for its approval and clearance.

In addition to the powers delegated to the Empowered Committee under the proposed arrangement, ONGC will also be given enhanced powers for new investments, replacements and renewals, charterhire, procurement and foreign exchange releases. This would help in avoiding cost and time overruns for projects.

It is felt that with the constitution of the proposed Empowered Committee, it will be possible for ONGC to revise its Eighth Plan target. The existing target envisages a production of about 45 million tonnes from the onshore and offshore fields of ONGC. In view of the increasing demand and in anticipation of the formation of the committee ONGC has drawn up an accelerated production plan (APP) which aims at production of about 50 million tonnes per annum by 1994-95.

While details of the plan to achieve the revised target are under finalisation, the focus would be on accelerating future addition to reserves, putting the new discoveries into production by innovative methods, enhancing recovery from producing fields, and streamlining procedures to avoid time and cost overruns. ONGC is likely to end the current Plan with a production level of 31.41 million tonnes of oil and 8.69 million tonnes of oil equivalent of gas. The total production during '88-89 was 29.64 million tonnes of oil and 6.96 million tonnes of oil equivalent of gas. This represents an increase of 28.3 lakh tonnes over last year's production of 33.78 million tonnes of oil and oil equivalent of gas.

In line with ambitious targets for crude and gas production in the Eighth Plan, there is likely to be a nearly two-fold increase on the drilling front. Commensurate with the increase in the various physical targets, the next Plan outlay is also likely to be more than double that of the Seventh Plan.

Official circles feel that the ONGC Plan targets though ambitious are feasible. The Plan programme is tight and timely completion of every component is crucial for overall achievement. The timely availability of upstream and downstream facilities for production and material inputs for exploration and drilling are vital to meet the targets set for the Plan. It is in this context that the proposed empowered committee is being considered.

In the case of ONGC, the empowered committee proposal has a successful precedent. An APP in the Western Offshore envisaging a production target of 63.14 million tonnes bound only by targets and investments was successfully implemented from July 1983 onwards. It is felt that APP could exceed the production targets of the Sixth Plan because of sufficient flexibility available for deciding the inter-project priorities of Plan programmes and investments.

ONGC's optimism about its envisaged production potential is based largely on the numerous discoveries it has made during the Sixth and Seventh Plans. Some of these major discoveries include Gandhar, Dahej and Nada in Gujarat, Narimanam, Kovilkalappal, Bhuvanagiri and Nannilam i Cauvery basin, Changmaigaon Adamtila in Assam, DA, CD, B, C D series in the Western offshore 16 in Krishna-Godavari and PY-3 Cauvery offshore.

The discovery of oil in the base of Bombay High and more recen the fractured basement of the field has raised hopes of increasi reserves and consequently the l these fields beyond the present e tations.

The entire production increase the offshore would be contribut fields other than Bombay High. the production increase from the ern offshore would be about 10 m tonnes, the Eastern offshore is exp to contribute over two million to Several new discoveries like the N R-series, CA/CD, D-18 and D- other isolated pools are expected t tribute towards production fro Western offshore.

The Panna and Heera fields reach peak production during the E Plan. The drilling of horizontal successfully attempted at durin present Plan would yield signi increase in production. A number tificial life schemes and pre maintenance schemes have been saged for improved recovery. E atory drilling would soon be under in the shallow waters of the G Cambay which would open up vistas for production. This would in attaining a production level of 3 lion tonnes from the Western offs

Gas production from South Ba which was started in October l expected to reach peak performan the Eighth Plan. Gas production i expected to commence from S-1 of Bombay High, B-55, mid and Tapti. The expected level of gas s from Western offshore is expected 26.20 million cubic metres per Drilling of horizontal wells to im productivity, pressure maintenan water injection, effective workove stimulation jobs, gas lift, etc., are to increase production.

HOEC-OIL to explore in Ganga valley

The Hindustan Oil Exploration Company (HOEC) will soon tie up with the state-owned Oil India Limited (OIL) to jointly undertake oil exploration ventures in the Ganga valley. HOEC will also contribute about 40 per cent of the capital to be invested for such ventures. HOEC is the first private sector company, which has been allowed by the government to undertake oil exploration in the country.

According to official sources, HOEC will also be the first company to invest risk capital in the oil sector. A memorandum of understanding between HOEC and OIL outlining the modalities of the joint operation in the Ganga valley is likely to be signed soon.

The government is simultaneously allowing OIL to take up exploration in the Ganga valley and the Kutch offshore areas. A licence to this effect is expected to be issued by the petroleum and natural gas ministry to OIL within the next fortnight.

As of now, OIL would be tying up with HOEC only for Ganga valley and go alone for exploration in Kutch offshore. An allocation of Rs. 160 crores has been made for exploration in both these areas. The Eighth Plan envisages drilling of five exploratory wells (25,000 metres) in 85,000 sq. kms. in Ganga valley and three such wells (15,000 metres) in 35,000 sq. kms. in Kutch offshore.

HOEC has preferred Ganga valley for the obvious reason that exploration costs are almost half of what offshore exploration entails. Since HOEC has limited funds and would not like to reduce risk element to the extent possible, it is not keen on Kutch offshore which would require more funds for drilling exploratory wells.

Subsequent to the government decision early this year to throw open oil exploration to Indian companies, HOEC was formed with Mr. Ajit Kapadia as its managing director. Its equity is jointly owned by six financial institutions, five banks and twenty five business houses. These included Industrial Credit and Investment Corporation of India, Industrial Finance Corpn. of India, General Insurance Corporation, Life Insurance Corporation, Unit Trust of India, Bank of India, Central Bank of India, Hong Kong Bank, State Bank of India, Reliance, Mahindras, Deepak Fertilisers, Glindia and Telco.

HOEC was reportedly willing to undertake exploration either with ONGC or OIL. The govt. wanted that HOEC should join hands with OIL for exploration. Subsequently, the onshore areas have been identified and modalities of joint operation are now being worked out.

The government preferred OIL for the joint venture with HOEC since it felt that ONGC was already entrusted with the responsibilities of exploring in offshore and onshore areas almost all over the country and also in collaboration with foreign companies. OIL should thus be given new areas and also the assistance of a joint venture with a private sector company.

The modalities to govern the arrangement between OIL and HOEC would recommend the norms for production sharing and for calculating operational costs of exploration. There are no problems in fixing norms for sharing oil production, as precedents have already been set in the cases of foreign companies undertaking exploration in some offshore blocks.

But in view of varying gas prices all over the world, the government has not been able to formulate norms for sharing production of gas. This is posing a big problem as Ganga valley is likely to produce more of gas than oil.

All over the world, oil exploration companies like to spread their risks by either taking up exploration ventures in different countries and locations or by joining hands with various other companies. Here, HOEC and OIL have decided to go in for the latter option. ONGC, on the contrary, has chosen the former course by going overseas for exploration in Vietnam, Malaysia and Tanzania.

RECORD PRODUCTION IN EAST

Col. S.P. Wahi, said that the ONGC's eastern business centre had achieved a record performance in productivity and operational efficiency with crude oil production of 3.09 million tonnes during the 1988-89 financial year. Col. Wahi said this was a 13 per cent increase on last year's production of 2.74 million tonnes.

An additional 2,369 tonnes per day of oil was generated in 146 wells against a targetted 1,300 tonnes per day from 115 wells through work-over operations. This was a 155% increase over the annual target during 1988-89, he said. He said that during 1989-90, ONGC had set a target of producing at least 3.4 million tonnes of crude oil per annum in the region. The drilling target had been set at 2,35,210 metres, he said. Besides identifying priority areas for intensive exploration activities, ONGC proposed to set up an LPG plant during the Eighth Plan with a capacity of 85,000 tonnes per year, Col. Wahi added.

WESTERN OFFSHORE PROJECT PHASE-II IN TROUBLE

The Lovraj Kumar Committee has expressed serious reservations about phase II of the Western Offshore Integrated Development Project (WOIDP). It is unlikely to be cleared without major modifications. Phase I of the project has been approved by the committe and the Petroleum Ministry is also expected to okay it, Mr. H.K. Khan, Union Petroleum Secretary said recently.

Phase II of the project is the construction of a parallel pipeline to the present one linking Bombay High to Uran as well as a vast ring pipeline encompassing the entire western offshore hydrocarbon region with landfall points in Gujarat. The proposals submitted by the Oil and Natural Gas Commission envisaged linking all future discoveries in the region to the WOIDP ring.

Coal gasification technology to be explored

Indian coal samples have been sent to six countries in an effort to identify and suitable technology for underground coal gasification and their use in power plants.

Underground coal gasification is being thought of as a step in the conservation of coal and to mine coal which lies deep and cannot be easily mined. Once suitable technology is identified, it would help in getting underground coal gasified to produce combustible gases.

The method has been tried abroad with some degree of success. The Union Government has proposed to put up a pilot test project for coal gasification at Mehsana structure of Gujarat at a depth of 700 metres for conducting in-depth studies in this regard.

Soviet assistance has been sought for underground coal gasification and detailed data have already been collected for three sites in this regard.

The Oil and Natural Gas Commission has also a project for gasification of lignite reserves of Gujarat located at depths of more than 800 metres.

Meanwhile, an expert group constituted by the Centre visited a number of countries recently to study the feasibility of gasification of Indian coal. The group has submitted its report.

As a follow-up of this report, a project titled "data generation and scale up on moving bed pressure gasification using coal containing 40 per cent ash" has been approved for implementation by the Government at a cost of Rs. 1.32 crores.

According to official sources, based on the results of the trials of coal gasification, now in progress at the Regional Research Laboratory, Hyderabad, and Bharat Heavy Electricals Ltd. Tiruchi, a decision would be taken on setting up a pilot plant.

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CIL SIGNS MoU WITH GOV

The Government signed a mem dum of understanding (MoU) with India Ltd. (CIL) for 1989-90, setti raw coal production target for C 183.5 million tonnes, on May 1 this year.

The production target for 19 was 171.5 million tonnes. Emphas been laid on underground min increase production to 64 million t in 1989-90. Exploration efforts w also be intensified to formulate new jects to meet coal requirements i coming decade.

According to the MoU, an imp ment in CIL's financial performan also aimed to be achieved. For the time, CIL aims to hit a significan surplus in its revenue operations providing for interest and prin repayments to Government.

The Government has agreed to t bound processing of CIL's invest proposals, speedy acquisition of and environmental clearance, supp equipment by public sector unde ings. The MoU was signed by Mr. Vijayasekharan, Secretary, Depart of Coal and Mr. M.P. Naraya Chairman, CIL.

CCS THROUGH BANKS FRO SEPTEMBER

The cash compensatory sup (CCS) scheme will be administere the commercial banks from Septen and the Reserve Bank of India is w ing out the details. This was revealed the representaives of Indian Ba Association (IBA) at the 'bank borrowers' meet in Bombay.

The meeting was sponsored by Associated Chambers of Comm and Industry of India (Assocha However, there is no proposal to burse duty drawback through the ba

UDCT Alumni Association launched

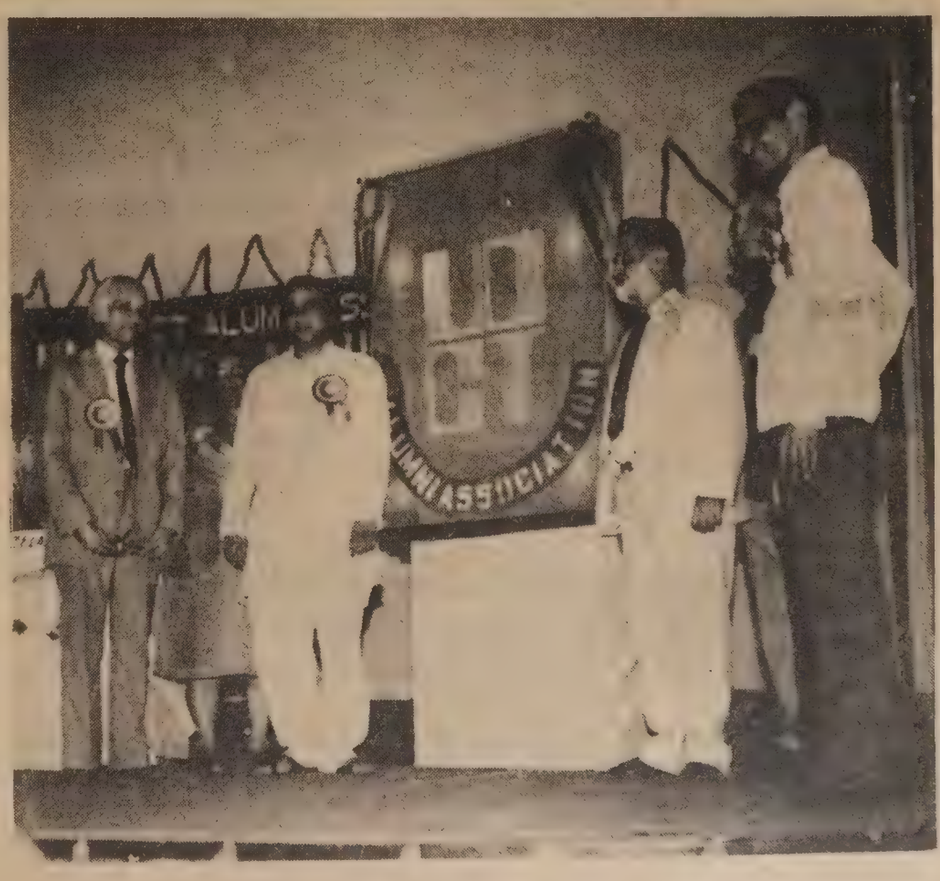
Former students of the Bombay University Department of Chemical Technology (UDCT) launched the UDCT Alumni Association on May 11, 1989. The association was formally inaugurated by Mr. Kamalkishor Kadam, state Minister for education. The association aims at exchanging ideas and promoting excellence in all branches of chemistry, chemical technology and engineering by bringing together all former students on a common platform and continue UDCT's leading position in the field. A report:

lcome Address: Prof. S.P. Potnis, rector, UDCT, and President, DCT Alumni Association.

"Hon'ble Kamalkishor Kadam, inister for Education, Government of aharashtra, Madam Vice-Chancellor, o-Vice-Chancellor, registrar, Distinished Alumni and invitees, my colagues and Ladies & Gentlemen:

"It gives me great pleasure to welme you all for today's Inaugural nction of UDCT Alumni Association the hands of our Hon'ble Education inister, Shri. Kamalkishor Kadam. his department of Chemical Technolgy has many unique features right from s inception, where distinguished sons f India like Sir M. Visvesvaraya, hri. K.M. Munshi, various industrialts, academicians and philantropists ame together and conceived the foration of this department. Initially two ourses, B.Sc. (Tech.) in Chemical ngineering and Textile Chemistry with n intake of only 20 students were arted in 1934 in the east wing of the hen Royal Institute of Science. Under he dynamic leadership of Sir Vithal N. handavarkar, Vice-Chancellor of ombay University at that time and his uccessors, the campus at Matunga was ompleted in record time and on 4th ugust, 1943, the Department of Chemcal Technology was shifted to its own resent campus. As time progressed ther branches of technologies were dded to the department. Now it has Chemical Engineering and seven differnt technologies like Dyes, Foods, Oils, Pharmaceuticals, Plastics, Paints and Textiles under one umbrella. Research has been an integral part of the UDCT from inception and our library culture is unique. The number of research students is about 30 to 35% of nearly 1000 students. The student to teacher ratio is also maintained at about 1 to 10. This gives this institution an unique distinction of very close and cordial relation between students and faculty. Since then, UDCT has produced many distinguished alumni who enjoy national and worldwide reputation. UDCT has provided many Directors to National Laboratories and equivalent organisations. Many UDCT alumni have also been honoured by the Government of India by conferring on them National Honours like Padma Vibhushan, Padma Bhushan and Padmashree. Though it would be impossible for me to read the whole list of distinguished alumni, to name a few I may mention -

Dr. K.H. Garda, MD, Gharda Chemicals Ltd., Prof. N.R. Kamath, Professor of Polymer Technology and Deputy Director, IIT, Bombay, Prof. G.P. Kane, Directorate of Technical Development, Dr. R.A. Mashelkar, Jt. Director, NCL, Pune, Dr. Nityanand, Director, CDRI. Lucknow, Mr. V.C. Rajadhyakhsha, Member, Planning Commission/MD HLL, Dr. Anji Reddy, MD, Standard Organics Ltd., Dr. H.N. Sethna, Chairman, Atomic Energy Commission, Mr. M.M. Shah, Commerce Minister, Govt. of India, Prof. M.M. Sharma, well known Chemical Engineer in the world,



The Minister unveiling the 'UDCT' Alumni logo.

Prof. B.D. Tilak, Director, NCL, Pune, Prof. K. Vendataraman, Director, UDCT and NCL Pune and many others. In addition 20 distinguished alumni were honoured during the Golden Jubilee which include - Prof. K. Venkataraman, Prof. G.M. Nabar, Prof. J.G. Kane, Prof. E.H. Daruwalla, Prof. G.P. Kane, Prof. N.R. Kamath, Prof. B.D. Tilak, Prof. A. Srinivasan. Shri. D.M. Trivedi, Dr. Homi Sethna, Mr. Vasant Rajadhyaksha, Dr. Nityanand, Mr. J.M. Nadkarni, Mr. I.A. Modi, Dr. Keki Gharda, Dr. A.V. Rama Rao, Dr. K. Anji Reddy, Dr. R.A. Mashelkar, Prof. M.M. Sharma, and Prof. D.V. Rege.

"Apart from producing distinguished teachers and researchers, UDCT has a unique culture in producing technocrats which is confirmed by a whole lot of entrepreneurs who even without any business background in the family have set up business houses with sizeable turnovers.

"It is a matter of pride for an institution like this where one can name any industry, chemical, dyes, foods, oils and fats, pharmaceuticals, plastics, paints, textiles and find a large number of UDCT alumni occupying key positions in these industries. Another feature of this institute is extremely close contacts between faculty members and industries by way of consultation and the industrial projects which not only helps the UDCT financially, but has a lion's share in orienting the research projects to cater to the needs of the industry and the country in general, without sacrificing academic vigour. The present collection by consultation fees goes well over Rs. 8 lakhs and I am sure that UDCT will be the pioneer institue to have such credit. Incidentally UDCT pioneered consultation work as a professional necessity in the '40's. Because of the excellence UDCT has in its faculty members, we have been able to draw an amount as large as about Rs. 4 crores during the last five years from various agencies like UGC, DST, MHRD, CSIR, BRNS and also the various private and public sector companies.

"High standards of admission and absolutely foolproof procedure to give the admission purely on merit basis has been the pride of this institute. This cream of students whom we admit and train for their professional career both at undergraduate and post-graduate level are so much in demand for jobs or admission to Universities abroad that most of them have several choices.

"UDCT has also a Library which is one of the finest in the whole of Asia and is extensively used by personnel from industry and their number exceeds 2000. The library works on weekdays and Sundays except 5 National Holidays in the whole year and is thus utilised to the fullest. We are proud to say that of the total budget of Rs. 12 lakhs per year nearly Rs. 1.5 lakhs comes from endowments created during the period of the Golden Jubilee and I am sure that no other library in the country enjoys this enviable situation.

"UDCT celebrated its Silver Jubilee in 1959 in the presence of the late Pandit Jawaharlal Nehru who visited this institute and praised its several achievements. We started collecting the list of alumni since then and went on adding year by year and concerted efforts were made during the Golden Jubilee which we celebrated in 1984.

"UDCT has established new records from time to time and we have established a number of endowments in the name of the past faculty members some of whom are still active after retirement. We have endowments in the names of late Prof. R.B. Forster, Prof. K. Venkataraman, Prof. G.M. Nabar, Prof. J.G. Kane, Prof. M.L. Khorana, Prof. N.R. Kamath, Prof. D.V. Tamhane etc. We have also an endowment in the name of Prof. G.P. Kane who is with us today. These endowments have surely arisen out of the innate interest of the alumni and the esteem in which our colleagues were held.

"The idea of the formation of the Alumni Association germinated during the Golden Jubilee itself due wholehearted support of the alum also in collecting a sizeable dona about Rs. 1 crore. Concrete step however taken during the UDCT try Meet in 1987, when a Com was formed under the Chairmans the Director with Shri. Kishore M ala (Bombay Oil Industries), Shri. Mokashi (Davy Powergas Pvt. Shri. J.R. Shah (Consultant; earlie Chika Ltd.), Shri. R.K. Mar (Goodlass Nerolac Paints), Mr Lashkari (Polyolefins Industries ited) with Shri. H.A. Bhat as secr who was alumni from the first bat Plastic and Paints and retired faculty member in 1984.

"Though all the members of Committee have put in their mig sort out various problems of colle the addresses, formulating the draft stitution, deciding the programm inauguration etc., I should give credit to Shri Kishore Mariwala wh put in life into this organisation an taken a lions share of the fina burden to make this infant grow t size we are seeing it today. The Bom Oil Industries belonging to Mr. Kis Mariwala, even went to the exte paying life membership to all the alu working with them and giving the f ity to payback to the Company as when they can.

"I can go on adding any numbe unique features for this institute b would like to conclude saying that the UDCT Alumni Association is i gurated, it will provide a common form for all the alumni numbering a eight thousand till today to help the mater in all possible ways and help progress further by adding more more feathers in her cap and rea height unknown to any institute so f

Introductory remarks: Shri. K Mariwala

"Honourable Shri Kamalkish Madam Vice Chancellor, Pro V

ncellor, Registrar, Distinguished sts and my fellow Alumni.

we are all aware, UDCT celebrated olden Jubilee in 1984. During those brations two facts emerged undisdly. Firstly out of the stocktaking he accomplishments of UDCT its lty and its alumni, emerged the aralleled record of fifty years of pur- of excellence and second fact that s reconfirmed - not that reconfirmaa was ever needed - was the tremenus goodwill that the alumni and the emical industry have towards our ma Mater.

"The record of the pursuit of excelnce has been recounted by Prof. Potnis d hence needs no further elaboration. ne goodwill that the alumni have for e Alma Mater has been very evident henever the alumni has been called pon to do anything for UDCT. This stitution is unique in the sense that the verence for the institution and particlarly for the distinguished faculty hasen demonstrated by the students by formation of endowments in the names of not only the departed but even living faculty members. Prof. G.P. Kane Trust, Prof. B.D. Tilak endowment and others are nothing but the feeling of gratitude the alumni have for their teachers or Guru. The second evidence of goodwill was evident at the time of the Golden Jubilee. At the time of the Golden Jubilee Celebrations, the spontaneity with which the alumni responded to swell the Golden Jubilee fund to more than a crore of rupees unconditionally was heart rendering. The feeling of gratitude - obligation even reverence - for Guru or Alma Mater is a common feature of all the advanced cultures and civilisations. In the Indian culture Guru has been equated with God. If guru is God surely the Alma Mater is the temple. In olden days we all know that gurus were all looked by the disciples without even being asked. Even today it is not uncommon particularly in the United States for the alumni to fund a large portion of recurring expenses through endowments. This tradition has established itself through the realisation that our teacher and hence our alma mater has given us certain values, certain capabilities which are beyond quantification and which stand us in good stead through our professional, intellectual and emotional endeavours.

Thus we as alumni - through the alumni association - shall try to give back a little bit of what we have received. Our giving will be in the form of financial and intellectual assistance to certain well defined needs of the UDCT.

"Firstly - financial help. I was shocked to learn that the tuition fees today for B.Chem.Engg. course are not very different from what they were when I was a student - more than 30 years ago! If inspite of this constraint, UDCT has achieved what it has, it is nothing short of a miracle! Imagine what the assistance for absolutely basic infrastructural facility like better communication, better libraries, better recreational or better hostel facilities can do!

Dignatories on the dias From L to R: Mr. J.R. Shah, Dr. S.P. Potnis, Mr. Kamalkishore Kadam, Mrs. M.D. Bengalee, Mr. K.V. Mariwala, and Mr. Z.F. Lashkari.

"One very important aspect of UDCT - unfortunately a bit obscured now - has been the then magnanimous endowments created by the founding fathers. Most of these endowments are ineffective only because over the years the value of the corpus has depreciated. We all directly or indirectly were the beneficiaries of these endowments created with very noble thoughts and wisdom of the founding fathers. Can we not revive these same endowments and restore them to the original glory and the purpose for which they are created? Fortunately UDCT has provided its alumni with professional capabilities which places the alumni definitely in the comfortable income bracket. I do not think it beyond the few thousand alumni to do something concrete in these directions.

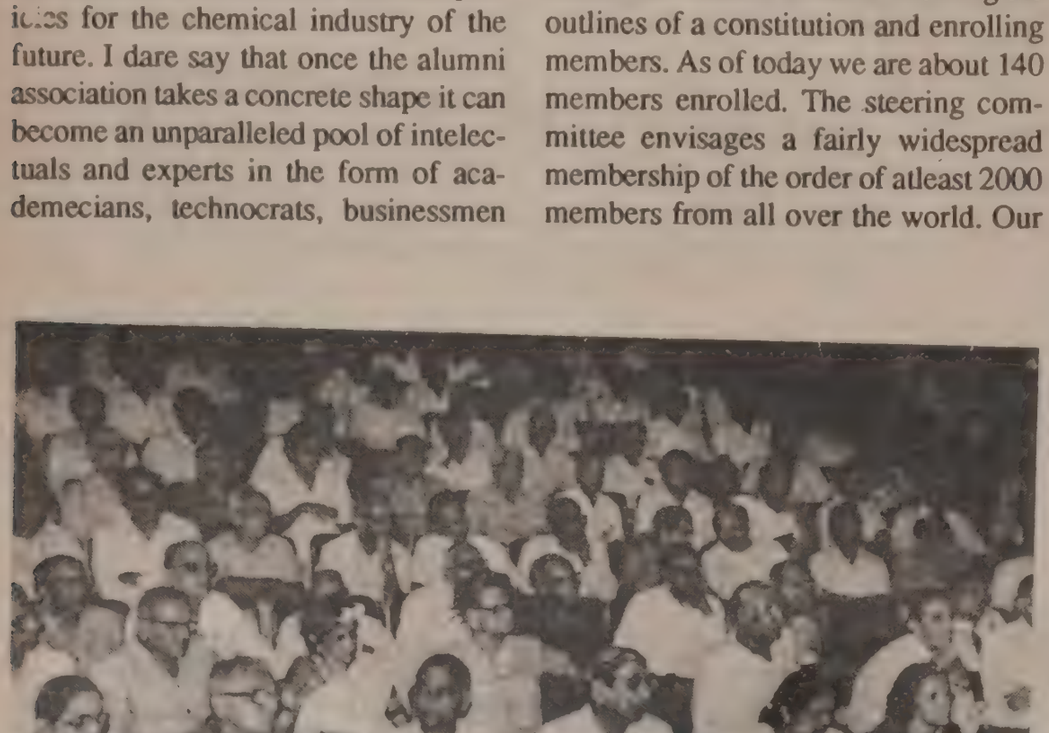
"Besides the limited sphere of providing material help the alumni association can play a very important role in contributing towards the creation of opinion for formulation of national policies for the chemical industry of the future. I dare say that once the alumni association takes a concrete shape it can become an unparalleled pool of intelectuals and experts in the form of academecians, technocrats, businessmen and students. Imagine the outcome of their deliberations on issues of national industrial importance. Yes - the trade & commercial organisation also try ω do so but with a vested interest. The very presence of academic stalwarts will thwart the endeavours of selfish businessmen to propagate ideas with short term gains in view! At the same time the practical experience of technocrats would lend credibility in terms of practicality of the ideas! Possibility of formation of this forum - in my opinion will be the greatest benefit that we all and the society at large can derive. Increased fellowship amongst the alumni due to interaction on these forums will be the intangible benefits for all of us, I am sure that before long quite a few similar ideas will emerge and the steering comittee will welcome these ideas from the members.

"Coming to the practical aspects of the formation of the association. Over the last few months the steering committee has worked towards evolving the outlines of a constitution and enrolling members. As of today we are about 140 members enrolled. The steering committee envisages a fairly widespread membership of the order of atleast 2000 members from all over the world. Our representatives in the various pa the country and even abroad have nominated. It is heartening to not we have located a group of abo alumni in Nigeria. The number in tries like the UK and USA is exp to be fairly high. To reach out to we have nominated Dr. Acharya n Salford University UK as our repre tative in the UK. We intend to ap atleast four representatives in va areas in the USA. We have as of three categories of membership; membership, ordinary membership associate membership. The Asso membership will enable those per who may not be past students of UD but are connected with UDCT as fac or visiting faculty to become memb The life membership fee has been k at Rs. 1,000 for residents in India or $ 100 for those residing abroad. adoption of a formal constitution take place in the next few months.

"I do hope that we will receive ov whelming support in form of enrolm from all the alumni to make this as ciation a viable and strong organisati

"In conclusion I would like to st that in keeping with our cultural valu we need to look at the formation of t association as a God sent opportunity serve our alma mater and the socie selflessly - God sent to repay back little bit from what we have reciev from society. Very appropriately may say

"Oh lord what is thine
I dedicate unto thee"
Thank you."



A view of the audience

Speech Delivered by Hon'ble Mini ter Kamalkishor Kadam, Minister f Education.

"It is indeed my pleasure to be abl to participate in this function. Th Department of Chemical Technology the Bombay University has enjoyed unique national and international statu It has a special significance in the sta of Maharashtra. In this state it is th

st institution imparting training in nical technology and engineering. today there are only a few insti- ns in the country which conduct ses in chemical technology. The tutes imparting education in chem- engineering are relatively many e in number. However the chemi- engineering degree given by this itute is rated to be one of the most stigious and this is indeed a matter pride for the state of Maharashtra.

'The chemical industry occupies a otal position in meeting the basic man needs and desires and in improv- the quality of life. It also makes very nificant contribution to the national nomy. We have a very high popu- ion base which is expected to cross billion by the turn of the century. We e formidable problems of providing fficient food, medicines and adequate elter. The chemical industry provides e vital inputs required to augment food oduction. The chemical industry has ovided several life saving drugs and emicals required for public health. hemical industry is all pervasive in veryday life and bestows on us innu- erable benefits.

"The state of Maharashtra has made ajor contributions to the nations' hemical industry. The first chlor-alkali lants and plants for manufacture of emi-synthetic fibres were set-up in this tate near Kalyan way back in the four- ies. The refineries in Bombay (Burma hell and Stanvac) were some of the arliest to be set-up in the country. The RCF at Chembur was the first major ntegrated fertiliser complex in the country. The first two petrochemical complexes (Union Carbide and NOCIL) were set-up in this state. The first major complex of basic organic chemicals (HOC) was also set up at Rasayani in this state. The dyestuff and dye-intermediate industry of the coun- try was born in and around the city of Bombay. Bombay has always been the country's major centre of textile indus- try.

"The discovery of the major reserves of oil and natural gas near the coast of Bombay has been a major face saver for the country. But for this discovery the foreign exchange situation in the coun- try would have been very precarious. About 60% of the requirement of the crude oil for the country is being met from Bombay High. The country is now poised for a quantum jump in petro- chemicals and downstream industry. The associated gas available from the Bombay High is going to be a major contributory factor for this development.

"For growth of any industry just as we need material and financial resour- ces, an essential requirement is that of well trained and competent manpower. This Department has played a legendary role in this regard. Due to its unique status in the country, it has always attracted the best of the talent. The UDCT has also been able to attract highly qualified and competent individ- uals on the faculty. By virtue of this combination the department has been able to produce first rate technologists and chemical engineers.

"I understand that the quality of the graduates produced in this institute is so outstanding that they are very much on demand in the universities in the West- ern countries. The chemical industry particularly in the state of Maharashtra, is dominated by the graduates trained in this institution. The contribution of this institute to the development of the chemical industry, however, has been much beyond its primary function of producing well trained personnels. The faculty of the institute has made signif- icant contributions through direct par- ticipation in the development of the industry in the capacity of consultants.

"The contribution of this department to the development of the dyestuff industry in the early days is very well known. Several distinguished faculty members and alumni at this institute have been advisers to the Government of India and have actively participated in the process of formulating the policy for the development of the chemical industry in the country. Apart from its contribution to the nation's development this department is also an internation- ally acknowledged centre of research. The achievements of this institute have been truly exemplary and they need to be recognised in every possible way.

"The institute has produced over the last fifty five years a very large number of alumni. I am told this number is over 8000. It is needless to state that most of them occupy senior and influential posi- tions in the industry. It is indeed very appropriate that the members of this large family get together and contrib- ute their might to further the cause of their alma mater which is so richly deserving. The Alumni Association can contribute to the development of the institute in many ways. The chemical industry is in the state of flux due to development of new technologies, new products and constraints of safety, pol- lution and cost of energy. The devel- opments and the changing scenario in the industry puts pressure on the aca- demic institutions to update their cour- ses continuously and modify their orientation to suit the demands of the industry. Participation of industry is very essential in formulating the aca- demic programmes. The Alumni Asso- ciation can provide a channel for this much desired interaction. It would pro- vide a reservoir of knowledge and experience which the institute can rely upon to tap as and when necessary.

"As I have already emphasised there is long tradition of advice and interac- tion between industry and UDCT. It is reasonable to expect that the Alumni Association will strengthen these ties and catalyse more vigorous interaction with industry.

"The primary responsibility of fund- ing the academic activities of this department is of the Bombay Univer- sity, the state Government and the national funding agencies like the UGC.

However, an academic institution like UDCT which is actively engaged in research has very varied financial needs. There will always be areas for which funding is not available from the above channels. The Alumni Association with such a large and distinguished membership may also be able to provide such small but critical financial inputs.

"Another cause, to which all the concerned agencies must give serious consideration is the question of autonomy. The departments which possess the critical size and have been recognised as centres of academic excellence ought to be considered for financial and administrative autonomy. I understand that in UDCT the individual sections are much bigger than several university departments. The Chemical Engineering Section, for example, has a faculty strength of twenty and has 75 research students. The UGC has on several occasions recommended that this department should be made autonomous. I assure you that the State Government will be willing to consider such a proposal sympathetically, expeditiously and on rational basis. The Alumni Association should also deliberate on this important issue and identify the inputs which it can provide for this cause.

"I offer my best wishes to the Alumni Association and to the Department of Chemical Technology."

UDCT: A Profile

The Department of Chemical Technology of the University of Bombay (popularly known as "UDCT") came into being as a consequence of Committees appointed by the Government of India in 1921 and 1930. This Committee had Shri M. Visvesvaraya as one of its members and the formation was a consequence of a motion in the Academic Council moved by Shri K.M. [illegible]

The Department had its humble beginnings in 1934 in the East Wing of the Royal Institute of Science with an intake of 20 students and 2 courses leading to the degree of B.Sc (Tech) in Chemical Engineering and Textile Chemistry. In August 1943, UDCT moved to its current location.

UDCT was also fortunate in having distinguished teachers and Alumni who have made a worldwide reputation for themselves. Some of these are:

Prof. K. Venkataraman, Director UDCT and N.C.L. Pune, Prof. B.D. Tilak, Director of National Chemical Laboratory, Pune, Dr. Nityanand, Director, C.D.R.I. Lucknow, Dr. H.N. Sethna, Chairman, Atomic Energy Commission, Prof. G.P. Kane, Directorate of Technical Development, Mr. M.M. Shah, Commerce Minister, Govt. of India, Mr. V.G. Rajadhyaksha, Member, Planning Commission, Prof. N.R. Kamath, Prof. Anji Reddy, Dr. K.H. Gharda, Prof. M.M. Sharma, and many others.

While UDCT had distinguished Alumni, a need for an Alumni Association was felt for a long time. Hence an Alumni Association has now been formed. The Alumni Association has been formed in order to exchange ideas, spread knowledge, stimulate thinking and to promote excellence in all branches of Chemistry, Chemical Technology and Engineering.

One of the objectives is to foster fellowship and bring together UDCT Alumni, its past and present faculty members and students on a common platform and to continue its leading position as a centre for excellence in the teaching and research of science and technology and to promote UDCT image and project its activities in India and abroad.

UDCT celebrated its Golden Jubilee in 1984 and 8000 students have graduated over the years. 1000 of these graduates obtained their Masters degree while 500 obtained their Doctorates.

The Department today offers gra and post-graduate courses and has of the finest facilities for Researc Development in the fields of T Chemistry, Chemical Engine Food Technology, Dyestuff Tec ogy, Plastics Technology, Paint T nology, Oils, Fats and W Technology, and Pharmaceutical T nology.

In addition, the Department hou Technical library considered to be of the finest in India.

Apart from the training of stude UDCT activities are centered aro Research and Development in c association with industries by way sponsored projects and consultation its faculty members, association with national and international seminars way of presenting papers, publication original work in national and inter tional journals which has resulted enormous support not only from Go ernment agencies like UGC, DS CSIR, COSIST, but public as well private industries.

The list of research publications impressive by any standards worldwi and the number of research papers pu lished in reputed international journa exceeds 2200.

UDCT has, hence, established itse as a centre of excellence in teaching a research of science and technology India. A fallout of this is that graduat from this institution are readily accepte for Post Graduate studies in all maj universities in the world.

Many of the Alumni of UDCT a scattered far and wide, both in India an abroad. It is hoped that by this inaugur function and through the good office of members of the press, informatio about the formation of Alumni Associa tion is disseminated far and wide so tha the Alumni has an opportunity to ge together under the aegis of the UDC Alumni Association.

Company notes

AN MAIZE AND CHEMI-LS

dian Maize and Chemicals Ltd. CL), promoted by Ferro Alloys poration Ltd. (FACOR) along with Pradeshiya Industrial and Invest-t Corporaton of U.P. (PICUP), is ring the capital market on May 31, 9, with a public issue of 36 lakh ity shares of Rs. 10 each at par. The e is being made to part finance 22.50 crores project for the man-cture of corn derivatives. India estment Fund is also participating in equity to the tune of Rs. 86.6 lakhs.

Announcing the public issue, Mr. gesh Saraf, Managing Director, said at IMCL was the first versatile com-site project in the country for the anufacture of corn derivatives. Its oduct-mix provides for the manufac-re of several value-added corn deriv-ives primarily for the pharmaceuticals nd food processing industries.

IMCL's product-mix includes mod-ied starches (3,300 tpa); dextrose nonohydrate (6,600 tpa); liquid glucose 5,600 tpa); dextrose anhydrous (1,650 pa); and maltodextrin (1,650 tpa). Of ne dextrose monohydrate capacity, ,650 tpa would be converted into Glu-ose D, a high-value, high demand pro-luct.

The project was ideally located in Bulandshahr, U.P., the heart of the corn producing belt. The plant and machin-ery is under erecton and trial runs were expected by September 1989. Commer-cial production was scheduled to com-mence in October 1989, he said.

The MD said the project cost was proposed to be financed with an equity capital of Rs. 866 lakhs and term loans of Rs. 13.84 crores. Out of the public issue of Rs. 360 lakhs, Rs. 43.30 lakhs had been reserved for employees, Rs. 25 lakhs for farmers/agriculturists, Rs. 36 lakhs for the shareholders of FACOR and Rs. 30 lakhs for SBI Mutual Fund. The balance Rs. 225.70 lakhs was being offered to the Indian public.

He said the technical collaborators had guaranteed 100 per cent capacity utilisation in the first year itself. The company projected to achieve a turnover of Rs. 24.17 crores during the 17 months period ended March 1991 at capacity utilisation of 60 per cent and hoped to achieve a gross profit of Rs. 407 lakhs and profit before tax of Rs. 133 lakhs.

The turnover estimated would be Rs. 19.90 crores in 1991-92 (70 per cent capacity), Rs. 22.75 crores in 1992-93 (80 per cent) and Rs. 28.44 crores in 1993-94 at 100 per cent capacity utilisation. The company hoped to earn a gross profit of Rs. 412 lakhs, Rs. 530 lakhs and Rs. 750 lakhs and a profit before tax of Rs. 218 lakhs, Rs. 336 lakhs and Rs. 556 lakhs respectively.

The projections were based upon the company's existing product mix. However, from the second year onwards, the company intends to start manufacturing a number of end-products in addition to high value addition to the existing range. Thus, the company's turnover and profitability was likely to improve even further. The company expects to pay a maiden dividend in the second year of operations, Mr. Saraf added.

CHEMOX CHEMICALS

Chemox a renowned name in chemical market has Chemox Chemicals as its flag-ship company. The company was promoted about 15 years ago by Mr. Shreeniwas Agarwal, a science and management graduate.

Mr. Agarwal's dynamic entrepreneurship, hard work, dedication and ability to size up the opportunities quickly, made it easy for Chemox to take rapid

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strides and turnover has gone up to the tune of Rs. 50-crores. Chemox Chemicals hopes to double it's turnover soon.

Presently Chemox is dealing in vital chemicals, solvents, bulk drugs, dyes and dye intermediates, etc. The group has branched out its activities throughout India and has offices all over the country. It has dedicated staff of about 100 persons.

The group's major activities include having agencies and dealership of Govt., Semi-Govt. organisations and reputed corporate bodies. Apart from yearly contract under Buy Back Arrangements with over 2 dozen manufacturers, Chemox is also catering to the needs of almost all the sectors of the industry notable among them is pharmaceuticals, laminations, dyes and dye intermediates, etc.

Further, the group is also having a number of units in Maharashtra, some of them are in small scale sectors, which manufacture bulk drugs like paracetamol, trimethoprim, erythromycin, chloramphenicol, etc.

Apart from its local activities, the group is exporting bulk drugs also mainly to European countries and within short span of one year the company has achieved export turnover of more than Rs. 3 crores and plans to double it in the coming year.

TANFAC'S BETTER PERFORMANCE

Tamilnadu Fluroine and Allied Chemicals has made significant progress during the 18 months ended March 31, 1989 with an increase in demand for various chemicals from the aluminium producers and better utilisation of capacity. The turnover has risen by 39.5 per cent, on an adjusted basis to Rs. 19.78 crores from Rs. 9.45 crores. The gross profit, before depreciation and interest charges, too has improved by 25.9 per cent to Rs. 5.61 crores from Rs. 2.97 crores in t vious 12 months. Interest charge increased to Rs. 262.06 (Rs. 189.18 lakhs) while the su aside for depreciation has been ra Rs. 294.32 lakhs (Rs. 206.38 lakh investment allowance Rs. 72,05 The residual loss is only Rs. 13.18 against Rs. 106.99 lakhs. The deb ance carried forward is Rs. 409.62 against Rs. 396.44 lakhs.

The company has also adequate erating capacity and the operations not be seriously affected becaus power shortage in Tamil Nadu th there will be an increase in the co the electricity bill. With expectatio a further increase in the output of minium and a larger demand for company's products, it can be an pated that the improvement noticed the past two years will be maintai in 1989-90. It is also stated that th are proposals for diversifying furt manufacturing lines.

ALKYL AMINES MAIDEN

The directors of Alkyl Amin Chemicals Ltd. have proposed to pa maiden equity dividend of Rs. 2-p share for the 15-month period end March 31, 1989, which works out 16% on annualised basis. The follo ing are the particulars of the worki results:

	for the period ended March 31, 1989 EC. 19 (15-month)	(for 12-mont (Rs. in crores)
Gross sales	11.28	6.79
Gross profit	2.25	1.28
Depreciation	0.63	0.44
Taxation	0.20	--
Net profit	1.42	0.84
Dividend (%)	16(No)	--
Dividend	0.27	--
(No) on annualised basis		

During the period under review, th company has wiped out the previou year's loss amounting to Rs. 38.7 lakhs

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In closed or semi-closed systems where elimination of solids is not pos-ble -- magnetic action then precipitates oft solid accumulations to the bottom f the boiler or tower basin, to be per-odically removed by standard bleed-ff or blow-down procedures -- which ust be consistently followed if max-mum benefit is to be obtained -- regard-ess of the treatment method employed!

Prevention of scale accumulation in process water has never been as simple or cost effective as Electro-Magnetic Treatment Unit now makes it.

The system is a most reliable scale prevention method and being electro-magnetic, has many advantages over other non-chemical means, which do not create the power field to do the scale control job as effectively. It also has the great advantage of eliminating the on-going cost and nuisance of chemical additives -- with only a one-time instal-lation cost -- and pay-back period of only one or two years.

The system has wide range of industrial uses, in chillers, cooling towers, heat exchangers, water lines and other installations. The Electro-Magnetic Treatment Unit is known as "SENTRY EMTU" and is produced in USA.

For further details contact M/s. Marketing International, 152, Greames Road, Madras 600 006.

BIMETALLIC WEAR COATING

APV, the world's largest manufacturer of food and chemical processing equipment, has developed a second generation bimetallic wear coating representing a major advance over existing bimetallic coating technology.

The wear coating, designated BORCOAT G3, has been developed specifically for extruders used in the chemical and food processing industries. The process is however equally applicable for any applications where extreme wear and corrosion are limiting factors. The BORCOAT system is a two stage powder deposition and heat treatment process. Its revolutionary nature lies in the heat treatment method, known as Hot Isostatic Pressing.

The coating consists of a dispersion of Tungsten Carbide particles in a matrix of Nickel Chrome Boride. It has excellent resistance to wear and corrosion. The Hot Isostatic Pressing process produces a 100% dense coating, diffusion bonded to the substrate, which will not crack or chip, even under the most severe conditions.

Using BORCOAT coatings, the life of conventional nitrided carbon steel twin screw extruder barrels has been extended from a few hundred hours to upwards of several thousand hours.

The BORCOAT system can be used to improve the performance of a wide range of components including pumps for abrasive slurries, heat exchangers, drill bits used in the oil industry, and all applications where wear and corrosion reduce component life.

Depending on the conditions which will be encountered in service, the coating composition can be modified to pro-

APV Baker BORCOAT powder coating is flame sprayed onto the surface to be coated using a computer controlled robot.

vide high corrosion protection, high resistance to abrasion, or any combination of the two.

For further information contact Mr. John Cope, APV Baker, CCS Division, Westfield Road, Peterborough, PE3 6TA. (UK).

MAINTAINING CONSTANT GAS-PRESSURE DURING TANK-VOLUME CHANGES

Pressure control equipment designed specifically for the balancing of pressures in liquid process and storage tanks during filling, storage and emptying cycles, is now available from Norgren Martonair Limited of Shipstone-on-Stour, England CV36 4PX.

Typical applications are processes where control to within close limits of gas pressure within a storage tank is essential to protect product quality. For example, in brewing or effervescent drink production, incorrect carbon dioxide pressure during storage can result in an unpalatable over-gaseous or flat product.

The new 55-001 tank balancing equipment supplied by Norgren Martonair comprises three principal items: the pilot-operated main pressure-regulator (Fig. 1); the pilot-operated relief unit (Fig. 2); and the pilot control regulator (Fig. 3). The relief unit is produced in stainless steel in order to facilitate cleaning should contamination occur during the pressure relieving cycles.

All units have stainless steel mounting-brackets and the relief unit is obtainable with 1 inch stainless IDF and RJT fittings. The main regulator and control regulator are ported Gl and Gl/4 respectively.

Operation: The pilot control regulator uses instrument-standard compressed air to supply pilot pressure to the main regulator and relief unit. Normally pressures in excess of 4 bar are not required. Operating pressures must be gauged from the main regulator. The tank is connected to the main regulator and relief unit via a common inlet/outlet pipe and tee piece. Normally a stainless steel non-return valve is included at the main regular outlet to prevent contamination of the regulator by the product.

The required pressure level is set on the control regulator. Subsequent operation of the system is automatic; if the liquid volume in the tank increases

NS 3210

Fig 1

•ALGINATE•
PROCALGIN-R
FOR PAPER INDUSTRIES
PAPER GUM
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BINDERS
PROCALGIN-S
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POLVINYL ACETATE EMULSION
C.M.C
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INDUSTRIES
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FOR TEXTILE INDUSTRIES
CO POLYMERS
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P.V. A SOLUTION
SILICONE EMULSION
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BINDERS (DIFFERENT GRADE)
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by raising the gas pressure beyond et level, the relief unit opens to vent he excess gas. If liquid is drawn off, pressure falls and the main regula- opens to maintain the correct bal- pressure. The inherent pressure f differential is not less than 7.7% 0% above the main regulator setting.

The pilot control regulator can be otely installed in control panels or r locations away from the main ves which can be directly fitted into ework or to panels mounted on the age tanks.

For further information contact M/s. rgren Martonair Limited at the dress given above.

GH LOAD-BEARING RONT AND REAR JMPERS FOR THE MW-M3

BMW AG has developed elegant odynamic bumpers from ®Bayflex 0 GR for the sports model of the 3 ies. This glass fibre reinforced pol- er engineering material formulated th polyurethane raw materials from yer AG is flexible and impact- istant, even at low temperatures. The ff yet flexible bumpers are also very ilicnt. Both bumpers are produced m glass fibre reinforced Bayflex 110 Phoenix AG in Hamburg. The use an IMR system results in particularly onomical production. The compo- nts are coated with a flexible ®DD oating in the same colour as the car dy.

For further information write to: Jagat nemicals Pvt. Ltd., Express Towers, th Floor, Nariman Point, Bombay-21.

QUIPMENT FOR NVIRONMENTAL NALYSIS

Leybold AG will be presenting the test in equipment for environmental analysis at the ENVITEC, Dusseldorf. Their new products are:

Binos IM 01: An instrument for quantifying trace concentrations of chlorine in emissions. Phorometrically determines the degree of bleaching of a methyl orange solution by chlorine present in air samples. The heart of this instrument is a BINOS 1001, equipped with a special cell for analysing liquids.

The methyl orange solution flows through the reference channel of the cell, then enters a helical reaction line, where it comes into contact with sampled air, before being passed through the cell's analytical channel. The differential absorption for visible light in reference and analytical channels is an accurate indication of the chlorine concentation in air samples. The entire, largely maintenance-free, instrument is supplied installed in a wall-mounting housing.

GEM 10: A gas analyser for tracking emissions in conformity with applicable governmental agency regulations ("TA-Luft" in the FRG).

This analytical system is modular in design, and readily adaptable to meet virtually any analysis task. The basic version includes an officially approved BINOS NDIR gas analyzer with analysis station for CO, an OXYNOS oxygen analyzer, plus components for gas sampling and gas preprocessing. The concentration ranges covered by the analyzer may be adjusted to conform to the type of furnace involved (coat-, oil-, or gas-fired) and to governmental agency regulations.

Incorporation of additional analysis channels e.g. for NO_X, SO_2, and CO_2, is a simple matter with this highly flexible system.

Also on display will be microprocessor-controlled analyzers from the extensive BINOS-line, plus gas handling components for use in a broad range of application areas, such as environmental analyses, industrial monitoring and chemical engineering.

For further information write to Leybold AG, Wilhelm-Rohn-Straße 25, D-6450 Hanau 1, West Germany.

NEW COMPACT PUMP SERIES COMBINES POWER WITH PORTABILITY

ENERPAC's new compact pump series, four portable models weighing from 12 to 14.5 kg. deliver the industry's highest flow-to weight ratio. The versatile, two speed electric pumps have flow rates of 3.2 l/min. up to 14 bar, and 0.1 l/min, between 14 and 700 bar, providing rapid response for a wide range of applications.

The series includes three-way and four-way and integral dump valve models, all available in 110-V and 220-V versions. All models have a usable oil capacity of 2 litres, making them suitable for operation of a broad variety of hydraulic tools and cylinders.

Key to the range's versatility is a 0.37 kW motor that operates at peak efficiency, delivering the high flow rate even with long extension cords.

Construction features include a housing of high-impact-strength polyethylene to protect the pump components, an ergonomically designed handle that makes the pumps easy to carry, even with a gloved hand, an externally operated relief valve, a 24-V motor remote control with a good hand grasp, and a gauge port for gauge installation.

The 24-V remote control ensures operator safety. On the three-way and four-way valve models, it provides a job feature that lets the operator fine tune the cylinder position for precise control. On the dump valve model, it provides automatic retraction of single-acting cylinders.

ENERPAC compact pump -- lightweight solutions to heavy-weight problems

The three-way valve model, weighing only 12 kg, is especially suitable for applications involving single-acting cylinders. And its 2 litres oil capacity also makes it efficient for use with a wide range of hydraulic fabricating tools. The four-way model is ideal for double-acting cylinders and tools requiring fast cylinder retracting speeds. The integral dump valve model provides fast, automatic retraction of single-acting cylinders in such applications as rebar and wire rope cutting. The series provides an effective solution for virtually all applications requiring a work-horse, lightweight, hydraulic pump -- including crimping of hydraulic hoses, electric cables, splicing of steel cables, cutting, riveting, punching, notching, pipe-beinding, pretensioning of bolts and lifting systems.

For further information contact ENERPAC, Division of Applied Power International SA, 47, Avenue Blanc, 1211, Geneva 21, Switzerland.

FLUE-GAS AND EXHAUST CATALYSTS FOR A BROAD AREA OF APPLICATION

Catalytic flue-gas and exhaust-emis- ents an effective method of reducing pollutant emissions from industrial plant and power stations.

Degussa AG and its subsidiary HD Ceracat GmbH of Viesau, a joint venture established together with Hutschenreuther AG, manufacture catalytic converters for the removal of nitrogen (DENOX method) and sulphur dioxide alongside three-way and oxidation catalytic converters. The products cover the entire range of applications for catalytic flue-gas and exhaust emissions purification.

Together with its partners Lurgi GmbH and Lentjes AG, Degussa offers a combined method (DESONOX) for the removal of both nitrogen and sulphur; this process, developed in conjunction with the Stadtwerke Munster power stations, is particularly suited to medium-sized power plants.

Three-way, oxidation and SCR catalysts are used for stationary engines, e.g. in block power stations, and oxidation cataysts for the purification of emissions from chemical processes and the processing of organic products etc.

For further details contact Degussa AG, Postfach 110533, D-6000, Frankfurt 11, West Germany.

PRECIOUS METALS RECOVERY FROM AUTOMOBILE CATALY CONVERTERS AND PHOTOCHEMICAL SC

Automobile catalytic converters when their useful life is over, are cl as valuable materials and not as w in view of the fact that they conta precious metals platinum, rhodium occasionally also palladium. In Eu platinum/rhodium catalytic conve are used for detoxifying autom exhaust emissions. 1 kilogram o base material contains approxim 1.5 g platinum and 0.3 g rhod jointly valued at about 60 Deutschm (DM) per kilogram of the catalys current precious metal prices.

The economical recycling of prec metals from this material requires cient planning. Exhaust systems ar moved in the car workshop and col ted by the scrap materials trade, the alytic converter itself removed fron metal casing, the scrap metal proce separately and the catalytic cores pa on in batches weighing at least 1,00 to refining companies such as the De ssa metallurgical plant at Wolfgang this largest metals refinery on the Eu pean continent, Degussa uses optim methods for the economical proces of automobile exhaust catalysts. company has already processed sev hundred tons of this material.

Silver recycling of process w from the photochemicals industry further topic dealt with. The b material consists of old films, elec lytically deposited silver, sludges c taining silver, and steel wool from graphics, radiology and materials t ing sector and from photographic lab atories. Degussa adopts sampling analysis processes specially matche each type of material and each deliv form, to ensure accurate and ra determination of the silver content

For further information cont Degussa AG, Postfach 110533, D-60 Frankfurt 11, West Germany.

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Please Contact:
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CHEMICAL INDUSTRY IN KERALA — RESENT STATUS, OPPORTUNITIES AND CONSTRAINTS*

Dr. P.V.S. NAMBOODIRIPAD
M.D., Hindustan Latex Ltd.

TRODUCTION

The objective of this paper is to have a glance at the present atus of Chemical Industry in Kerala and to evaluate in brief e opportunities available for future growth as well as the onstraints that hinder its growth.

If a study on the history of chemical industries in Kerala s made, some interesting features can be seen. In the devel-pment of chemical industries in Kerala during the last 50 ears there have been two cycle periods; one is the era of ir C.P. Ramaswamy Iyer and the other is the era of Shri .V.Thomas, Shri M.K.K.Nair and Prof. Chandy. Almost all he basic chemical industries had been started in the first era f Dr.C.P.Ramaswamy Iyer. For example, taking from South, ndustries like Travancore Titanium Limited, Travancore Rubber Works, Punalur Paper Mills, Travancore Plywoods Limited, Travancore Cements Ltd., FACT, TCC, Travancore Rayons Limited etc. it can be seen that the list covers sophisticated products like titanium dioxide, plywood, paper, man-made fibres, fertilisers, caustic-chlorine etc. This is an excellent panorama of basic chemical industries, structure and he visualisation of such a chain of chemical industries nearly 50 years ago is quite fantastic and we should take our hats off to this conceptual planning.

However, not much diversification has been done to any of the above infra-structural industries during the last thirty years, though some new chemical industries have sprung up in the second era like Cochin Refineries Ltd., Travancore Electrochemical Industries, Comminco Binani Zinc Ltd., Periyar Chemicals Ltd., United Catalysts (I) Ltd., Southern Gas Ltd., Malabar Cements Ltd., Kerala Minerals and Metals Ltd., Kerala Chemicals and Proteins Ltd., etc. Most of these industries are more or less independent, though some of them are utilising products of basic chemical industries of the first era, as raw materials.

CHEMICAL INDUSTRY TODAY

From this historical background, it is evident that the establishment of the basic chemical industries was the result of sound and foresightful conceptual planning. Almost all these industries such as fertilizer, caustic soda, paper and pulp, man-made fibres etc. were pioneers in their respective fields even at the national level. Further, all these industries have been based on locally available raw material. In the case of FACT, manufacture of synthesis gas from wood was a novel idea and this was the biggest such plant in the world during those days. Similarly pulp, paper and fibre industries were based on forest resources of Kerala.

If foresight and meticulous planning had been the hallmarks of yesterday, today's case is just the reverse. The major industries of today are the products of bargaining with the Central and State Governments. As a result, these industries are neither based on the available raw material resources of Kerala nor having any sound technical footing. The state government is spending money on various new industries of less strategic importance. It would have been more prudent to concentrate on production of more value-added products using the materials produced by the existing industries as raw materials. For example, Travancore Cochin Chemicals should have diversified into calcium chloride, carbon tetra chloride, polyvinyl chloride etc. based on the by-product chlorine available from their existing plant. This would have helped not only to ensure the financial stability of the industry, but also to make available a new range of products which could serve other industries as well.

The present day growth of industries is in a mushroom fashion. As mentioned earlier, by political bargaining, we get some trickles from the Centre and some other northern State entrepreneurs invest some money on projects in which they have got interest. Even now it is a debatable question whether our state has got a real white paper on strategy of industries within the next five or ten years.

It is beyond doubt that most of the process industries in Kerala need technological upgradation. Almost all chemical industries in the State were started more or less two or more decades ago. The processes employed were perhaps the best at that time, but at present they have become obsolete.

Brief data on the large and medium scale industries in Kerala is given in Table I.

Since it is not possible to have an exhaustive general survey on the status of each and every chemical industry in the state, an attempt is made here to have an overview of the major

* Paper presented at the Seminar on Potentials, Problems and Constraints for Growth of Chemical Industries in Kerala organised by Chemical Industries Association, KSIDC and Institute of Chemical Engineers, Trivandrum on 18-2-1989.

Table-1
LARGE AND MEDIUM SCALE INDUSTRIES IN KERALA

Number of units	211
Total capital outlay	Rs. 2,000 crores
Employment:	
1. Direct	95,000 Nos.
2. Indirect	200,000 Nos.

industrial ventures. For convenience, a beginning is made from the South.

Titanium Dioxide

Travancore Titanium Ltd. has adopted Sulphuric acid route for making titanium dioxide. This is one of the first chemical industries of the state and the only factory producing titanium dioxide for the last 50 years. The modern trend is the manufacture of titanium dioxide through chlorine route. The new plant of Kerala Minerals and Metals Ltd., has already started production using the chlorine route and is expected to attain rated capacity shortly.

Titanium dioxide is a monopoly industry even to a considerable extent. However, in the existing plant the same process and technology continues to be used without modernising the technology or diversifying the process into other products.

Trivandrum Rubber Works Ltd.

This is one of the pioneer industries, manufacturing cycle tyres. 95% of the rubber in the country is being produced in Kerala, Dr. C.P. Ramaswamy Iyer had visualised a value-added product of rubber. The technology was quite good at that time and the quality of the product was also excellent. However, for one or two decades, neither did technological upgradation take place nor any appropriate diversification, with the result that the unit is in a very difficult situation.

Technological upgradation does not mean employing modern technology alone, but economic capacity of the plant, raw material changes etc. are also equally important. Here the major failure was the lack of diversification and the capacity. The potentials of a rubber based industry had been completely overlooked with the result that the initial lead gained was lost and the competitive thrust from elsewhere in the market pushed this unit into really trying situations.

Punalur Paper Mills Ltd.

This is also one of the first in the country put up with imported plant and machinery. It was started with foreign collaboration and was running successfully. After Independence, the Government could not carry on the business and mately it became a private sector unit. However, for rea which are not very evident, the dynamism of a private in try was not seen on the technological scene in this indu While more modern plants were set up elsewhere in the c try, this unit kept on with the old processes. The upsv in the pulp and paper industry, we hope, will now start the public sector newsprint unit at Velloor.

Travancore Plywoods Ltd.

This plywood factory was the first one in the country ad ing modern sophisticated technology. It was visualised years back to utilise our forest resources and make va added products instead of merely selling the wood. It v a well-conceived idea and at the time of starting it was of the most modern factories. However, the change of te nology did not get into this industry and with the incre in the number of factories in other parts of the country, t industry also started facing problems.

Diversification, generation of new and improved produc etc. are very important. Most of the plywood manufactur have entered into production of veneer and such sophis cated wood products during the last 15 years. Competiti from synthetics should have opened the eyes of those charge of the unit and helped the creation of newer produ lines with wood or a combination with synthetics.

Travancore Cements Ltd.

Until recently this was the only plant in the country pr ducing white cement, which has great demand even at preser During the first ten or fifteen years the price differenc between white cement and the portland cement was negli ible. Now the price is more or less three times higher tha the portland cement. Here also the technology used at th time of inception of factory has not been changed. Howeve the boom in construction and the scarcity of raw material ensured that the unit faced no financial problems. But thi also prevented improvements in the products, and very litt attempt seems to have been done on diversification.

Travancore Rayons Ltd.

This was the first man-made fibre plant in the country started much before National Rayon, Century Rayon etc came into being. The capacity was of course very small, bu was gradually increased. While the other rayon factories have subsequently gone for diversification to tyre cord as second generation and to Nylon as third generation during the last 25 to 30 years, this plant still manufactures only rayon fibres and cellophane. Those who have diversified the process to tyre cord and nylon tyres are doing extremely well, but this

t is really in doldrums. Some of these industries have ent- d even the fourth generation, i.e. manufacture of carbon ments, one of the most modern innovations.

ectrochemical Industries

Travancore Electrochemical Industries Ltd. was one of the oneering industries in the country using electricity as a ajor raw material. This was in the private sector from the ry beginning and hence it has made a considerable amount progress in capacity utilisation as well as in creating new pacities. However, they were not very keen on further velopments and diversification with the waste gas and other -products. The present trend is recovery of considerably ch percentage of carbon monoxide gas, i.e. 70 to 77% and try into manufacture of methanol and various other C-1 emicals. Development of C-1 chemicals from the basic arbon monoxide gas is one of the attractive proposals imple- ented in the developed countries in the recent past. Of ourse they are in the know of things and it is hoped that ey may divert their attention to that end. And the uncer- ainties in the petroleum situation has also resulted in other ountries using acetylene as a building block for some pet- ochemicals.

ACT Ltd.

Much is known about this particular industry to almost all echnologists and scientists in the State. They have definitely ade a considerable amount of change from wood charcoal o electrolysis of water, gasification and steam reforming in he last 30 years and it will not be fair to say that they have ot looked into the technological obsolescence. However, the apacity of the plant is a big bottleneck, especially with the Udyogamandal division. In developed countries such small apacities would have been competed out even ten years ago. Of course, with the caprolactum production, the situation may hange and it is hoped that a good deal of technological inno- vations would be introduced at Udyogmandal.

T.C.C.

This was the first caustic soda plant in the country, put up during the period of Dr. C.P. Ramaswamy Iyer. Many other caustic-chlorine plants have diversified to chlorine util- isation processes such as calcium chloride, carbon tetrach- loride as second generation and some of the caustic chloride plants have diversified to polyvinyl chloride and other pol- ymers. At the same time the pioneer caustic soda manufac- turer is still producing caustic soda, chlorine, hydrochloric acid etc. and has never thought of entering into other fields even after 50 years. Now it is too late and the capacities for calcium chloride, carbon tetrachloride etc. are more than the demand in the country and there is not much scope.

Ceramic Industries

The best clay in the world is available in Kundara. Kerala Ceramics was put up much before independence and it was going on very well at that time. However, with the modern production technologies and product diversifications and start- ing of other similar plants, this establishment developed pro- blems. With such an excellent quality china clay we could have gone in for more sophisticated products instead of what we are producing at present. Of course, the size, scale of pro- duction etc. are also vital for this industry.

OPPORTUNITIES AHEAD

Opportunities for the chemical industry in Kerala are really boundless if we have the vision to capture them, the will to implement them and the capability to sustain them. As I pointed out earlier, there is vast scope for production of value-added items based on existing products from our indus- tries. Expansion of existing capacities is another aspect. Expansion followed by vertical diversification is ideally suited for certain types of industries. For example, expansion of refining capacity of Cochin Refineries from the present 4.5 MT per annum to 6-7 MT per annum and recovery of xylene can open up avenues for the production of a wide range of petrochemicals.

Starting of new industries to bridge the gap between supply and demand is a third possibility. Areas with vast scope in this respect include photographic chemicals, pharmaceuticals, scientific glass etc. More details are provided in Table II.

Table-II
ADDITIONAL CAPACITY REQUIREMENTS IN INDIA
(For selected Products)

Cement	- 4 million tons
Industrial alcohol	- 3.4 lakh kilo litres
Photographic chemicals	- 137 tons
Poly propylene	- 26,000 tons
Drugs and pharmaceuticals	- 650 tons
Dyes	- 5388 tons
Perfumes	- 125 tons
Chlorine	- 3.1 lakh tons
Printing ink	- Rs. 410 crore
Polytetra fluoro ethylene	- 1884 tons
Diphenyl methane	- 28 tons

If we are successful in locating LPG at Cochin High, a vast new range of opportunities will spring up. Non- availability of ethylene, which is the basic building block for the production of a number of commercial products such as PVC, polyurethanes, polyesters and polyvinyl acetate, has

been the main hinderance in setting up such units. With LPG available in abundance, supply of ethylene can be ensured.

Apart from the availability of raw materials and appropriate technology, other decisive factors for the success of an industry are adequate financial resources, skilled manpower and infra-structural facilities. Various governmental financial institutions such as KFC and nationalised banks are always ready to render financial assistance to viable projects. Kerala has got the best human resources in the country in terms of academic accomplishments, intellectual capacity and general health, behaviour etc. Excellent infra structural facilities such as perennial rivers, excellent ports, rail and road approaches are available in Kerala.

CONSTRAINTS

This should not, however, lead us to the euphoric conclusion that the industrial scenario in Kerala is a bed of roses. There are problems, bottlenecks and limitations. These can be broadly classified into:

1. Technical and technological constraints
2. Environmental constraints
3. Financial constraints

Technical and Technological Constraints

Among these, the most important one is process obsolescence. In process industries, application of proper technology is vital and suitable upgradation is a must. We have miserably failed in this area and reached a point of no return. Revival of these industries will require pumping of considerable resources.

Failure to carry out timely diversification has adversely affected many process industries. In many of these cases, there is no scope for diversification at present since sufficient production capacities have already been established in the country.

Shortage of raw materials and high transport costs are other constraints. Depletion of forest resources is a major threat facing the pulp and fibre industries.

Environmental Constraints

The main constraints in this area are:
1. Lack of professionalism
2. Lack of continuity of management
3. Over emphasis on pollution
4. Interference of bureaucracy.

Timely expansion or diversification is essential not only for the growth but also for the survival of any process industry. Lack of professional expertise and orientation at the top has led to the decline and fall of a number of process tries. We do not have to go far to seek examples since of such cases can be seen in Kerala.

Continuity of management at the top is a must for the tive formulation and implementation of policies. Un nately, this is lacking in most of the industries, especia the governmental sector. On an average, a chief exec gets only one or two years tenure at a place. This har commitment to the industry and slackens its growth.

No process industry can be established without amount of pollution. But this should be controlled to be w permissible limits. Though there is a statutory board to ulate and monitor these aspects, various public forums started creating a big hue and cry over these aspects, m out of place. This has created an atmosphere which is conducive to the establishment of any new process indu We have to decide whether to industrialise and become sufficient or continue our dependence on other states or c tries.

Two types of bureaucracies are prevalent in Keral political bureaucracy and the bureaucracy of the perso in the administrative services. It is hard to believe that democratic set up, political interference in industry is ess tial. Similarly, filling of posts of Chief Executives w administrative and police service personnel for short peri creates lack of continuity and professionalism.

Financial Constraints

Although initial financing can be done by financial in tutions, the industries have to generate their own funds s sequently. In the case of many industries, regeneration is m or less a myth and the capital is eaten away, with the res that the industry becomes sick in a short while. Ov employment, poor financial management and inadequacy marketing efforts are some of the reasons for such sickne

CONCLUSION

Looking back, we have had a dynamic past from wh we have come to the stagnant present. Opportunities a boundless. Prospects for development are bright. Althou there are constraints, these will not come in the way on we decide to become our own masters. A welcome attitu towards professionalism, continuity of management a upgradation of technology is to be generated and fostere Political and bureaucratic interference must be resisted. T people should be educated against undue fears about poll tion. The ultimate goal is development, and the tool tec nology. The option is now open either to capture opportuniti and develop; or to succumb to the constraints and perish

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A Tribute to a Pioneer– Prof J.V. Bhat

(3.3.1913-21.12.1985)

Prof. J.V. Bhat, the doyen of microbiology in India, was an inspiration to his colleagues and students alike. Even today, his memory lives on through his pioneering research in microbiology and community hygiene.

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t is my personal privilege to be here today at the seminar nmemorating a pioneer, Prof. J.V. Bhat, a great scientist our country. It is very unusual that someone can pioneer nething in India and be recognised and today's seminar lf is a great tribute to him. We at Eureka Forbes Ltd. con-er ourselves fortunate to associate with it and to contrib- in our own small way to the profession of microbiology ich Prof. J.V. Bhat started in India. It is people like him o have built our business at Eureka Forbes Ltd. in the field water purification by way of "Aquaguard".

Water symbolically goes back to our cultural heritage and dition. There is a proverb in Gujarati, which says, "Water feared less than fire and yet fewer suffer by fire than by ater", which implies that there is a need for pure water in r country. Today, forty years after independence and almost xty years after we have introduced microbiology in our Uni-ersities, we still have problems with clean water.

I have had the privilege of working, starting my working areer and seeing many examples of food, cosmetic and harmaceutical industries. Over the last twenty five years, have seen a change (which is not complete) that has come bout in these industries. Many years ago water was never eated before being used at the factory line. Having witnessed any industrial facilities abroad, I found that even for clean-ng, people would not use water with a high degree of con-amination in overseas factories. Therefore we support fully ll endeavours of this seminar and look at other extremes of vater problem in our country, especially in the villa-es.

In the Fifth five-year plan, the Government of India esolved that we would like to have good water for our vil-ages, for which three criteria were set: 1) Those who do not ave a source of water within a distance of 1.6 km., 2) the water is microbiologically free from disease-causing worms, nd 3) the water does not suffer from salinity. With this back-ground they identified 16,000 villages which have to be cat-ered to. At the end of the V plan, 19,000 villages came under heir purview. In 1983 the mid-term review envisaged 230,000 villages to be provided with clean water. In Sep-tember 1988, the Government planned a massive campaign to tackle the drinking water problems in 227,000 villages by 1990 (nearly 40% of all Indian villages would fall under this category). The programme hoped to supply 40 litres of pot-able water per capita per day in the villages. This being so, what is the position in cities? I thought over this problem and my findings are the following:

Let us assume that we can provide pure, clean, drinking water to the top 250 cities in the country. The Indian organised pharmaceutical industry sells drugs worth Rs. 2,000 crores per year, of which stomach ailments and water based diseases amount to Rs. 250 crores and Rs. 350 crores respectively. Thus Rs. 600 crores worth allophathic drugs are consumed. Another Rs. 700 crores worth homeopathic and Ayurvedic drugs add up to a staggering figure of Rs. 13,000 crores. According to some estimates, the normal ratio of medical bills to drug bills is 1:1 and according to others it is 0.5:1. We may assume a figure of Rs. 2,000 crores. There are 750,000 hospital beds in 250 cities and if we assume that 20% of these are occupied by patients suffering with water-borne diseases, there would be 150,000 patients. The average expenses per patient per day is assumed to be Rs. 100. The overall expenses would amount to Rs. 1.5 crores per day or about Rs. 550 crores. This amount could be saved if everyone in the cities alone would get pure, safe drinking water. An industrialist or a planner knows that if one saves Rs. 550 crores, it is worth investing Rs. 5,500 crores, taking 10% return and that it is well worth it. So it costs Rs. 5,500 crores to provide clean water to 250 cities. This is a challenge facing anyone who works in the business of water, which includes microbiology.

This is a challenge that we face because in our country water has an identified serious problem. We talk only of 1/4th or 1/5th of the population which resides in these towns and where the savings are Rs. 5,500 crores. Look at the rural areas and the savings that are possible, direct savings which can be productively used somewhere else. Apart from the health benefits, people would live longer. Now let us look at it this way that if water technology could be a real profession instead of a very limited one that it is today in the country, it would bring tremendous benefits.

In 1926, it was primarily and mostly bacterial contamination that we talked about. In 1986, we talked about massive pollution by chemicals which was unknown in 1926 and those are the problems of water which we also need to resolve, for microbiologists have not only to concentrate on the bacterial problems but also on the chemical problems and other problems of pollution that are developed by man.

We will have to look at cheaper combination and energy and technologies. Why do we not get that from the West? The reason is very simple. In the West no such water pro-

* Delivered at the Prof. J.V. Bhat 75th Birth Anniversary Seminar on 'Clean Water — The State of Art' — for Food, Pharma, and Cosmetic Industry, held in Bombay.

blems exist. Although we are proud of our product and I do not want to make a sales pitch, we found to our surprise and shock that our product Aquaguard was better designed than any American or Japanese product and this is what we were told in a Israeli fair and the reason is very simple that we face the problems that those people do not; so we make an attempt to solve the problems and our solutions may not be perfect and they are a long way from giving pure safe drinking water to the masses either at their home or at the municipalities. New technologies that have been brought into the country for clean, safe drinking water have to be also cost effective.

Even if I go back to the earlier figure of being able to spend Rs. 5,500 crores in the urban areas alone or perhaps double or triple that figure for the rural areas, it is still a lot of money to be found. With that money, we have to give our people clean safe drinking water. If we do that, I sincerely hope and pray that it may be in our lifetime. Indians will change because of better health and hygiene.

We at Eureka Forbes really feel that the microbiologists who joined us have contributed significantly, to product development and research. However, we have taken an unusual step to exposing them to every discipline throughout the world, exposing them to what other companies are doing, to what other municipalities are doing in order to find out and deliver for our country as best as we can to our pr and technology.

I believe that the microbiologist's profession will e tomorrow to looking at all the problems of water trea and making sure that people in our country get better q water. Let us hope that though the first forty years of pendence have not delivered the basic necessity of safe d ing water, if not in our lifetimes at least in the lifetim our children and grandchildren, the profession of Micr logy will do so.

Finally I would like to speak about two or three th which I sincerely hope that young men and women w look at before they progress in their careers of microbio in our country.

Do look at all the problems, in another perspective. Do l at the fact that people are completely unaware of what pr lems in water are. It is amazing, but true that 70% of educa Indian believe that they must boil water first and then fi it so that they get safe drinking water. Even this basic kno ledge, that you should filter the water first, and then boil it that the filter media does not add anything more to the wa is not known in our country. In our country, the professio microbiologist has to do a lot to educate the people and in our humble way, would always be prepared to contribu

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CHEMICAL WEEKLY
SUPPLEMENT ON
LEATHER PROCESSING

MICROPROCESSOR CONTROLLED SYSTEMS FOR TANNERY WET OPERATIONS*

K.V. RAGHAVAN
Central Leather Research Institute, Adyar, Madras 600 020.

STRACT

Microprocessor based process control systems are being reasingly used in tannery wet operations for better con-l, operation flexibility and energy/chemical savings. This per highlights the state of art in microprocessor control tems with reference to wet operations like tanning. Future ential for their applications in newer areas is also exa-ned.

The development of microprocessor based process control hnologies has made significant impact on the automatic ntrol of chemical, mechanical, electrical, metallurgical and ied process plants. There has recently been an emphasis the leather industry to reorient the process operations in neries to implement some of the new process control strat-ies based on microprocessor systems. They include beam use processing, pretanning, tanning and post tanning ope-ions and finishing techniques. The technical objectives hind the reorientation process include accurate process rameter control, operation flexibility and reliability, ener-/chemical savings and rationalisation of material handling. ne present article highlights the strategies, hardware needs d typical application areas for microprocessor controlled stems in tannery wet operations. Particular attention is paid the tanning operation wherein the benefits of automation e most evident.

PPLICATION AREAS IN TANNERY WET PERATIONS

Commercially, tanning is carried out by contacting hides/kins with a finite amount of tan liquor. It is a dynamic pro-ess in which the hide pH and possibly the basicity of the nineral tannage undergo continuous changes. A process con-ol engineer should know that leather of acceptable quality esults from this unsteady state process though with poor reproducibility. The latter aspect is significant for introduction of process control system in the tanneries.

For the application of microprocessor based control systems, the following steps in the tanning process are of vital importance under Indian context:

1. Stripping (40 - 9/10 - 90)
2. Water washing (40 - VL - 25)
3. Bleaching (40 - 3/4 - 60)
4. Water washing (40 - VL - 45)
5. Chrome tanning and basification (40 - 3/4 - 360)
6. Water washing (50 - VL - 80)
7.
8. Neutralisation (50 - 5/6 - 165)
9. Water washing (50 - VL - 40)
10. Retanning, dyeing, fat liquoring etc. (60 - 6/7 - 210)
11. Water washing (30 - VL - 40).

Note: VL -- Variable.

The data presented in the paranthesis are typical temperature (in °C), pH and duration (in minutes) of each operation. A variety of chemicals are employed for the operations. They include sodium bicarbonate, borax, sodium sulphite, degreasing and bleaching agents, oxalic acid, basic chromium sulphate, retanning agents, a range of fat liquors and dyes, formic acid and other additives. Fig. 1 shows the operations plotted on a time chart for three process streams operating in parallel. The actual working schedule in many tanneries is far more complex. The following operations need precise control and monitoring:

1. Temperature control and logging
2. pH control and logging
3 Volume/weight control of chemicals and water
4. Level control in chemical and water tanks
5. Flow regulation of chemicals
6. Drum speed and direction control
7. Float recycles
8. Draining of treated tan liquors

Paper presented at the 24th Tanners Get-together on the theme of "Design, Development and Inplant Control for Leather Industry" held at C.L.R.I., Madras on 28-30 January 1989.

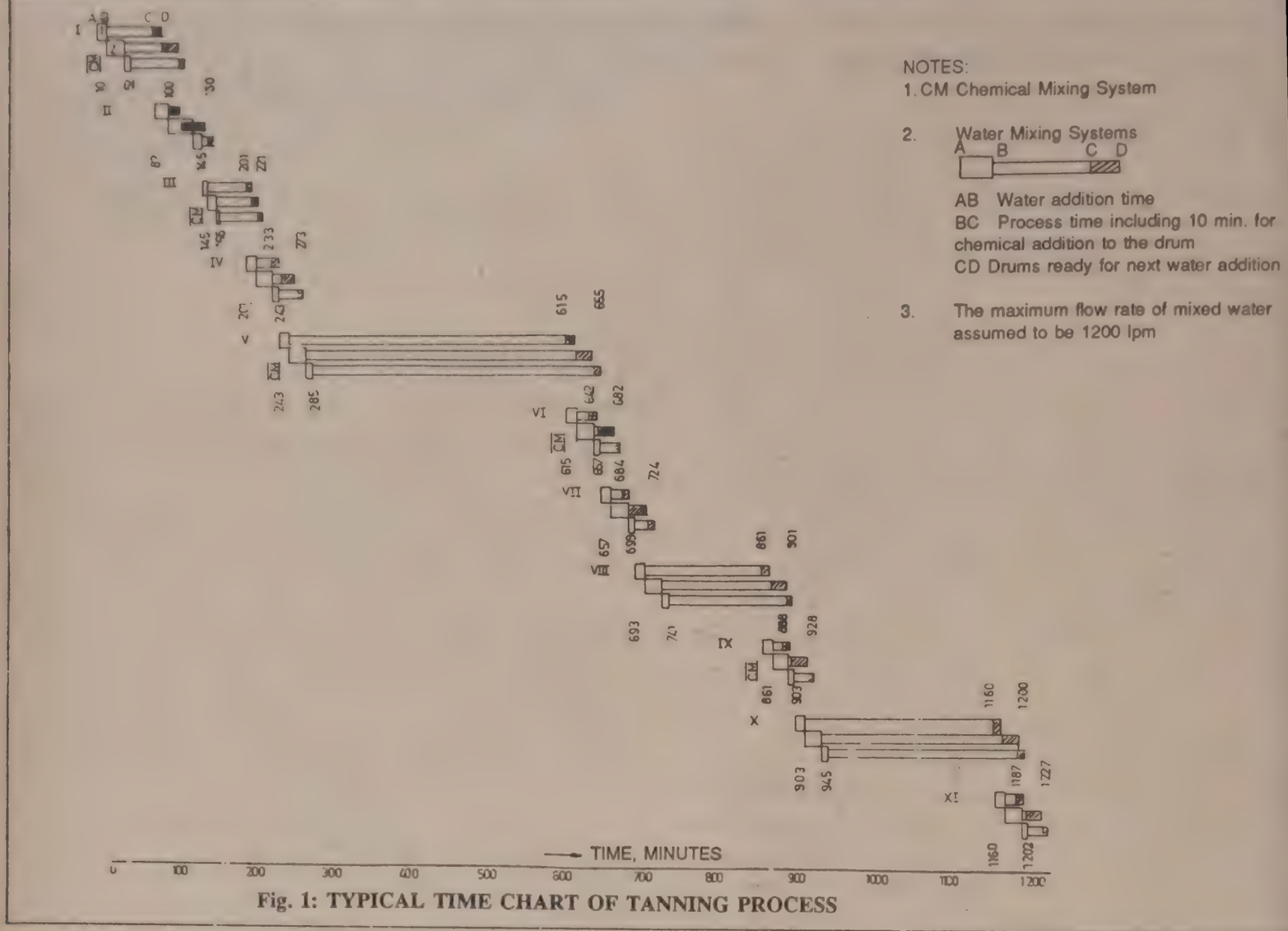

NOTES:
1. CM Chemical Mixing System
2. Water Mixing Systems
A B C D
AB Water addition time
BC Process time including 10 min. for chemical addition to the drum
CD Drums ready for next water addition
3. The maximum flow rate of mixed water assumed to be 1200 lpm
TIME, MINUTES
0 100 200 300 400 500 600 700 800 900 1000 1100 1200

Fig. 1: TYPICAL TIME CHART OF TANNING PROCESS

9. Time control for various operations
10. Indication for manual intervention
11. Preparation of protocols for process recipes.

STRATEGIES FOR MICRO PROCESSOR BASED CONTROL SYSTEMS

While evolving control strategies, collection of various electronic and pneumatic analog inputs, integration of the computer output into the control system and simplicity of back up schemes are important factors to be given due considerations in tannery systems. Supervisory control strategy based on microprocessor adjustment of the instrument controller set point and instrument control of the manipulating variable is the most suited since lower demand is placed on the microprocessor system. A limitation of this strategy is that the amount of microprocessor backup has to be confined

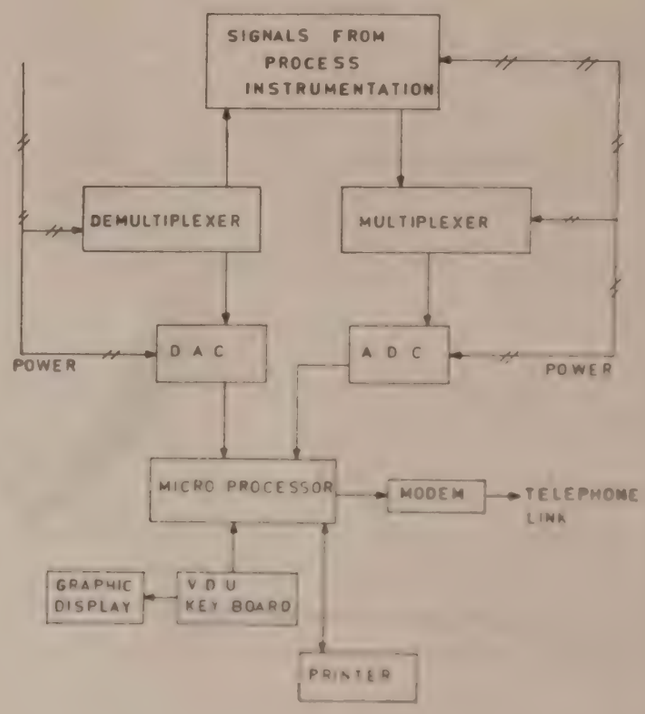


FIG 2 FUNCTIONAL DIAGRAM OF A MICRO-PROCESSOR CONTROLLED SYSTEM

necessary schemes required by the tannery engineer. her advantage is that the process signals are simultane- fed to the computer and other analog controllers; the r's failure does not cause immediate process upset. The onal control of a micro processor control system is n in Fig. 2.

a typical wet section of a tannery, the most commonly ntered process analog signals are temperature, level, volume and pH. They must be conditioned i.e. line- d, magnified, filtered and converted to digital mode e being picked up by the microprocessor. A multiplexer es several analog signals in a serial manner like a selec- witch. Demultiplexing is the opposite of multiplexing. tions of the microprocessor include signal conditioning, conversion, man-machine interface and system commu- ion. The functions of the man-machine interface is to ay the scanned data on VDU screen to enable the plant ator to enter requests to the microprocessor for control.

PORTANT CASES OF MICROPROCESSOR NTROLLED WET OPERATIONS

ntrolled Water Addition System

annery wet section requires hot and cold water in large ntities. Approximately 600 kl are required for a proces- of 7000 skins for the operations listed in the earlier sec- . Microprocessor controlled system can automatically ver a given quantity of water to a preselected drum at eset temperature and time. A general feature of the water ition system in a tannery wet section is the large, unsche- d and many times overlapping demand for steam (Fig.3). ble 1 shows the various options available to generate hot er and their relative advantages and disadvantages.

Figures 4 and 5 provide a schematic presentation of immer- tube heaters and the types of heat exchanger systems. A ch of hot water storage equipped with a combination of ect steam sparging and pump around the heat exchanger tems is a typical example of a two phase heating set up th a provision for steam cushioning. Details in Fig. 6

Supply of water at desired temperature to various drums n be effected through a water mixing valve/battery. The rangement consists of hot and cold water feeder lines, a ee way mixing and proportionating valve, water meter with pulse transmitter, temperature controller, exit lines with ixed water and other control accessories. Figure 7 shows ypical system provided with hot water recirculation facil- for achieving temperature stability of the water streams fore they enter the drums and for the recuperation of the used mixed water. The microprocessor can perform multi- e functions in this case viz:

1. Automatic water mixing and temperature stabilization
2. Directing the mixed water to the appropriate drums
3. Selection and volume metering of water
4. Selection and rigorous control of mixed water temperature and
5. Programming and printing out of water addition schedule.

Implementation of Microprocessor Controlled Water Addition (MCWA) System requires extensive piping network. Fig. 8 shows a typical piping layout. Package MCWA systems are available in the international market. Typical specifications of such systems are:

1. Operating pressures: 2-4 kg/cm²
2. Operating Temperature: 30-70°C (± 1°C accuracy)
3. Mixed water supply rate: 400-1200 lit/min.
4. Number of drums to be handled by a single battery: 6-8
5. Number of pre-selected water temperatures which can be programmed: 4-6.

Controlled Chemical Additions System

Most of the chemicals employed for the tanning process are in liquid form and accuracy of their measurement is of importance in achieving consistent quality of leather from every batch. A Microprocessor Controlled Chemical Addition (MCCA) system has to fulfill the following process needs:

1. Feeding of chemicals or their formulations from the storage tank farm.
2. Automatic dosing of chemical volumes into the chemical premixing tank.
3. Transfer of mixed chemicals to the prescribed drum.
4. Memory storage of chemical quantities according to batch weight.
5. Print out of the dosings along with time schedules.

MCCA systems are generally based on load cells with electric probes. The other accessories are level controls for main chemical tanks, automatically controlled dosage valves for transfer of mixed chemicals, electronically controlled agitator systems with time adjustment for mixing vessel and automatic failsafe devices including high level alarms and interlocks for the pumps protection against running without liquids and overload.

Fig. 9 shows a typical MCCA system connected to drums in a tannery. To accommodate manual addition of powders and small quantities of formulated chemicals, intermediate chemical tanks can be incorporated. This arrangement will not upset MCCA system functioning. MCCA units can also be remote controlled with a computer system.

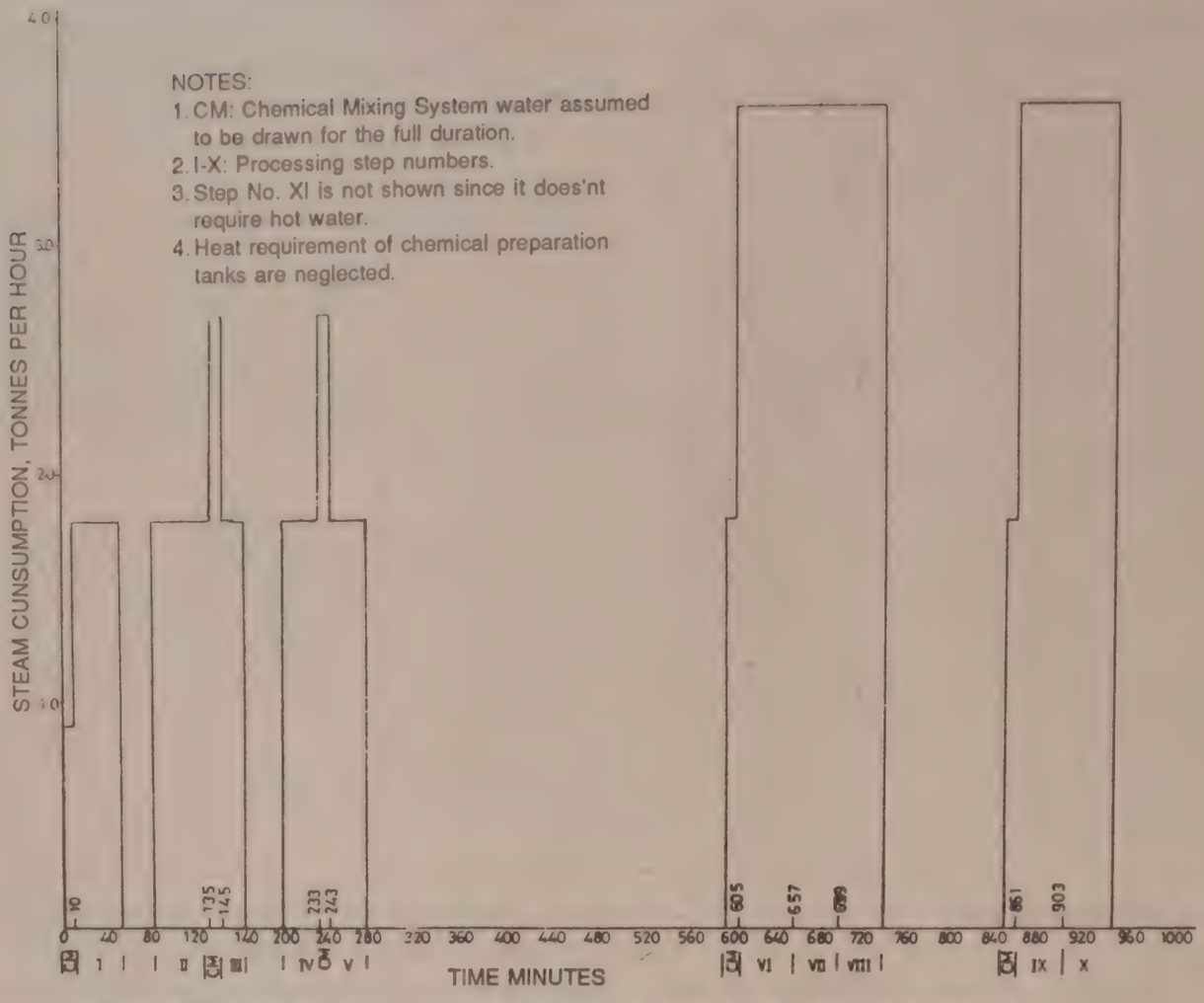

NOTES:
1. CM: Chemical Mixing System water assumed to be drawn for the full duration.
2. I-X: Processing step numbers.
3. Step No. XI is not shown since it does'nt require hot water.
4. Heat requirement of chemical preparation tanks are neglected.
STEAM CUNSUMPTION, TONNES PER HOUR
TIME MINUTES

Fig. 3: TYPICAL STEAM CONSUMPTION PATTERN IN MCWA SYSTEM

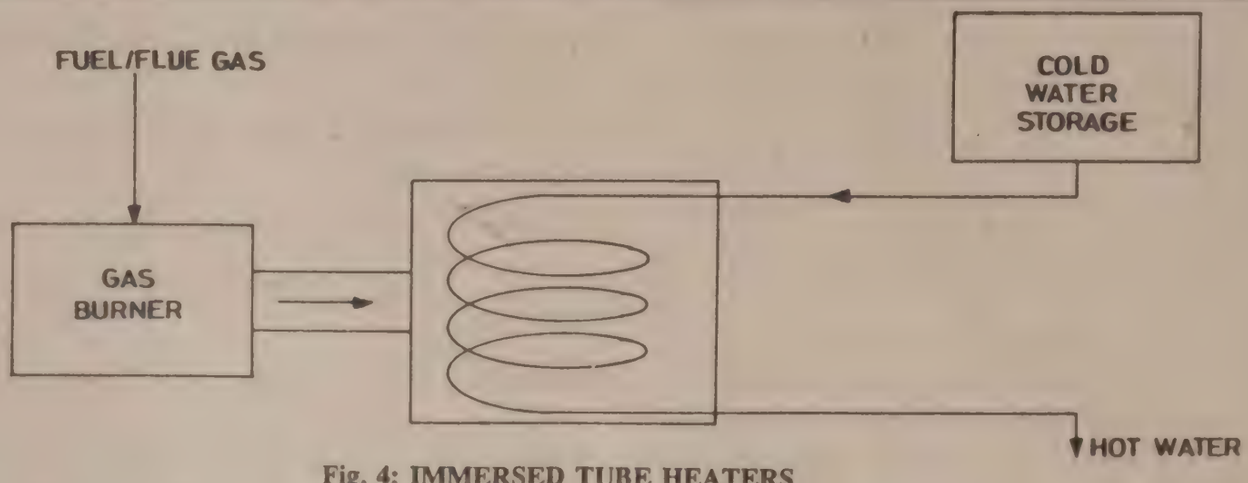


Fig. 4: IMMERSED TUBE HEATERS

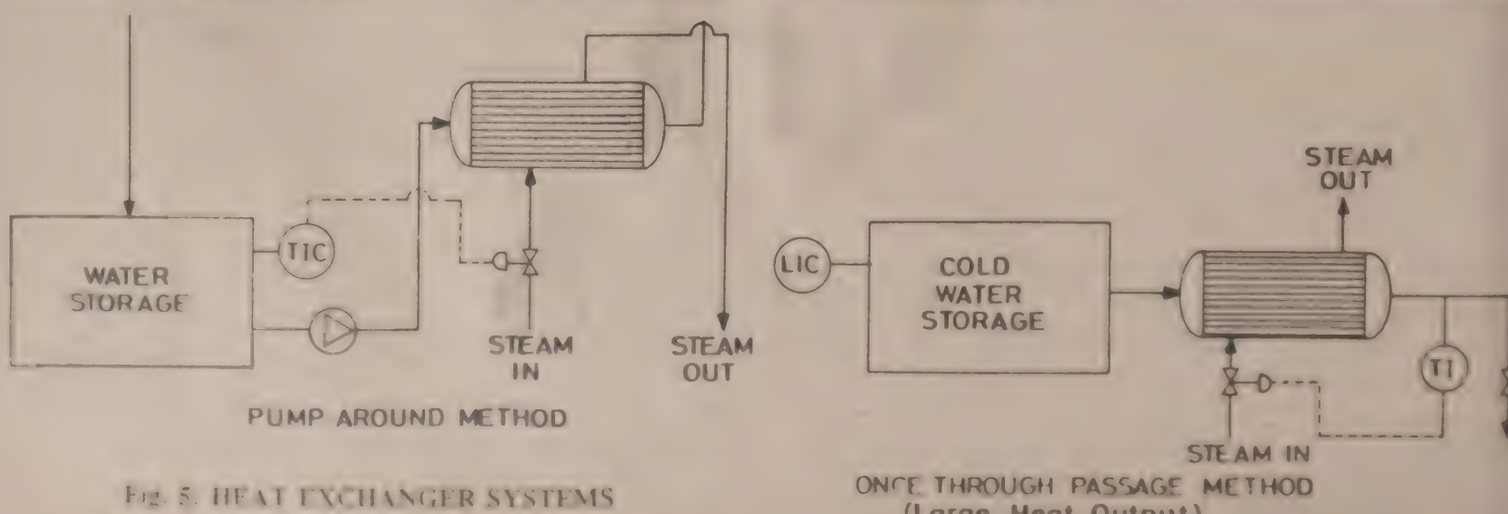


Fig. 5: HEAT EXCHANGER SYSTEMS

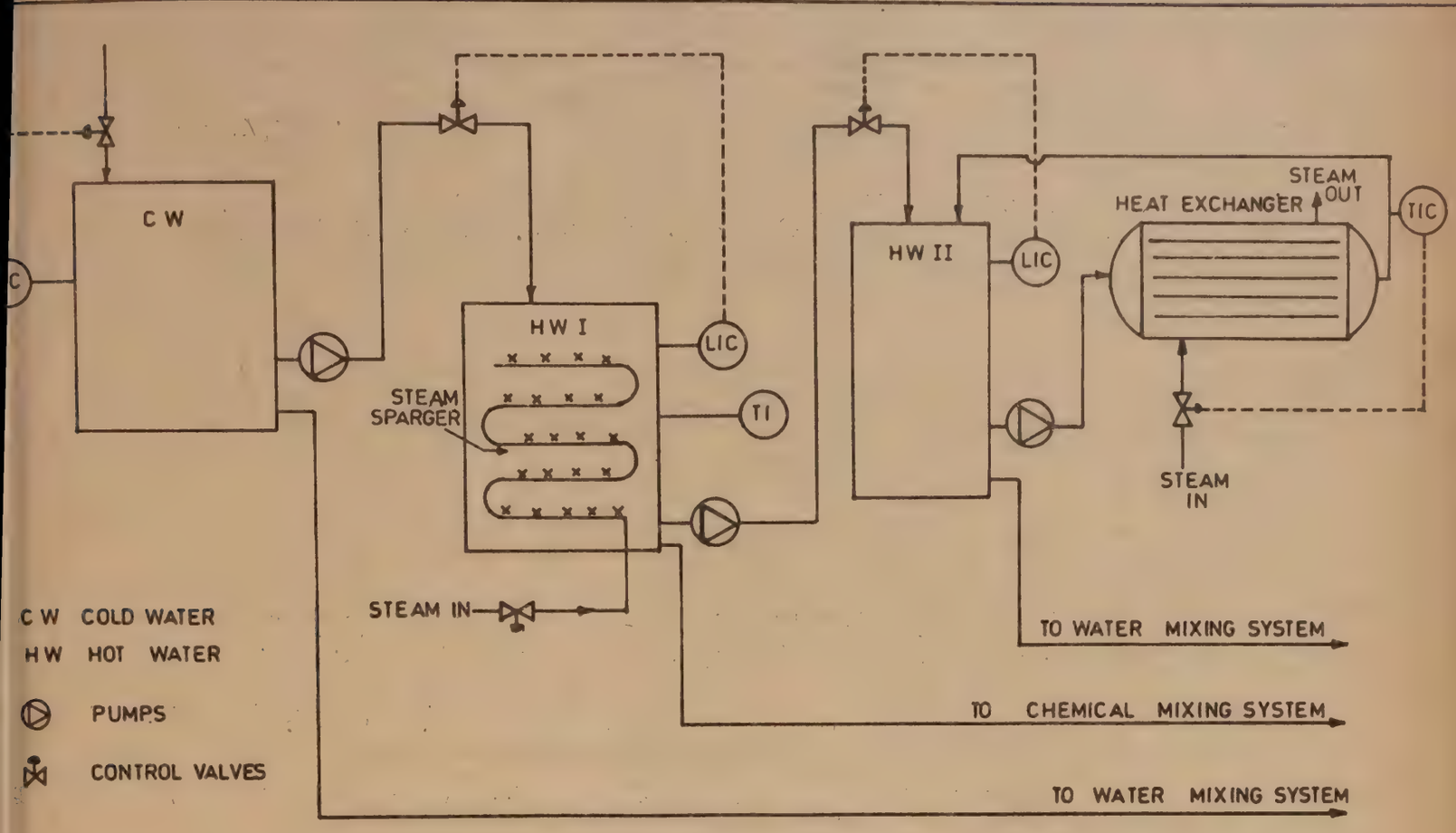


Fig. 6: A COMBINATION HOT WATER SYSTEM

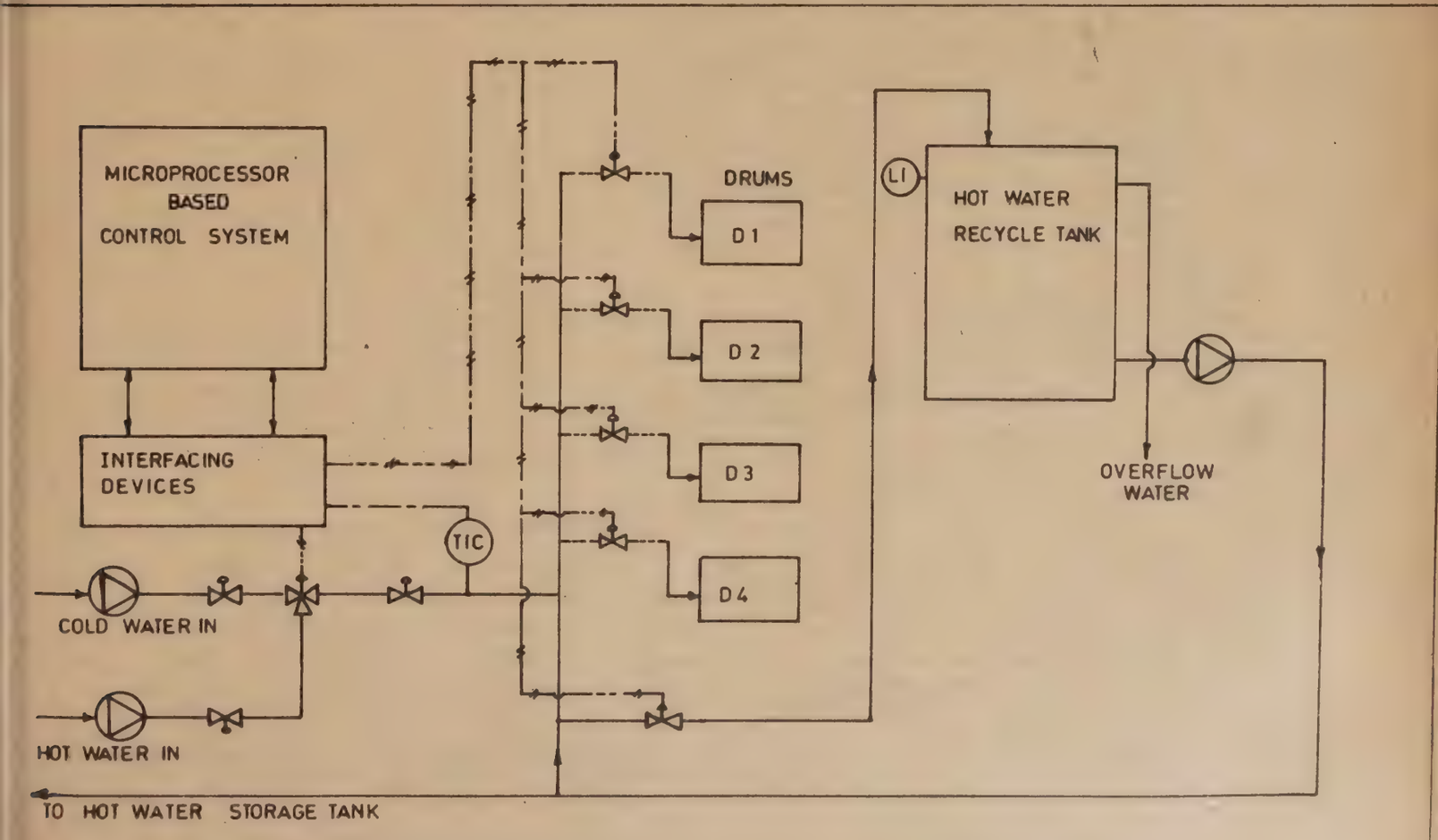
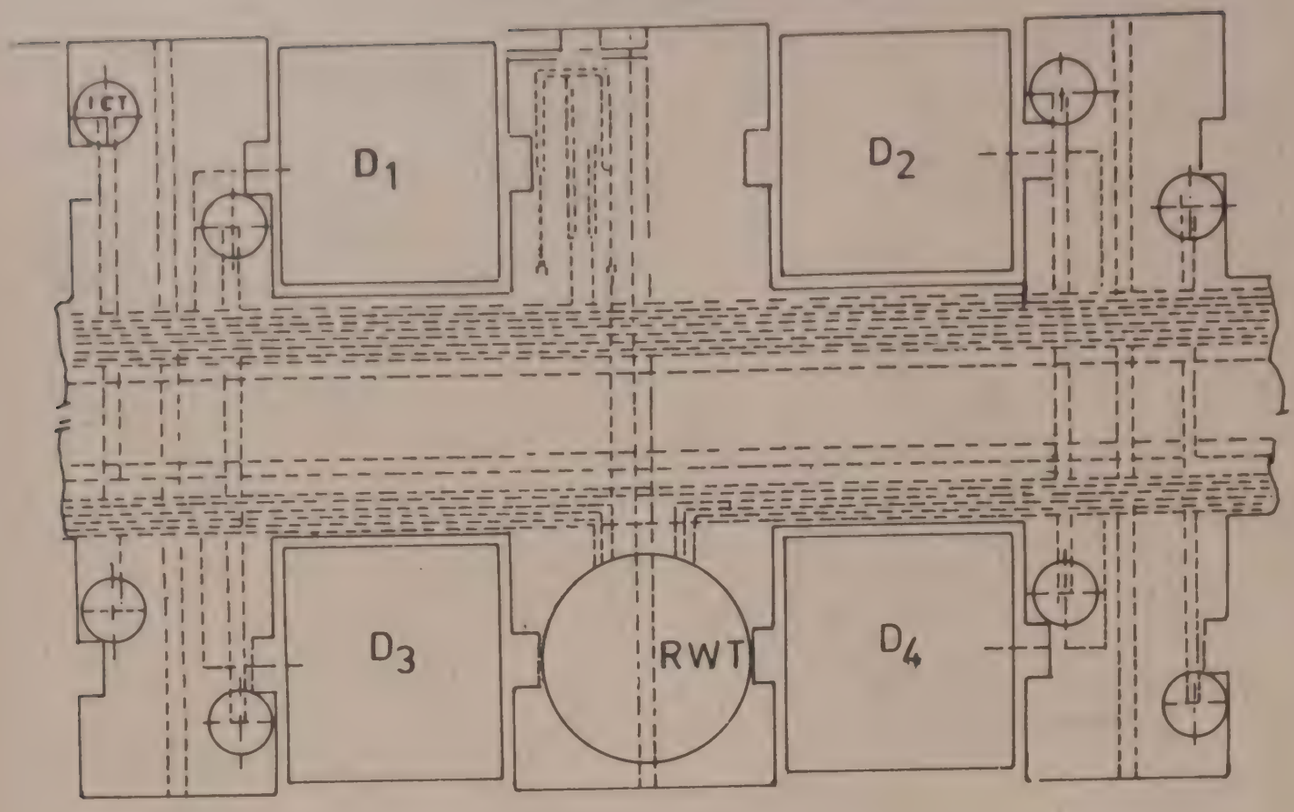


Fig. 7: MICROPROCESSOR CONTROLLED WATER MIXING AND SUPPLY SYSTEM



ICT: INTERMEDIATE CHEMICAL TANKS

RWT: RECIRCULATION WATER TANK

D_1-D_4: DRUMS

Fig. 8: PROCESS PIPING NETWORK FOR MCWA

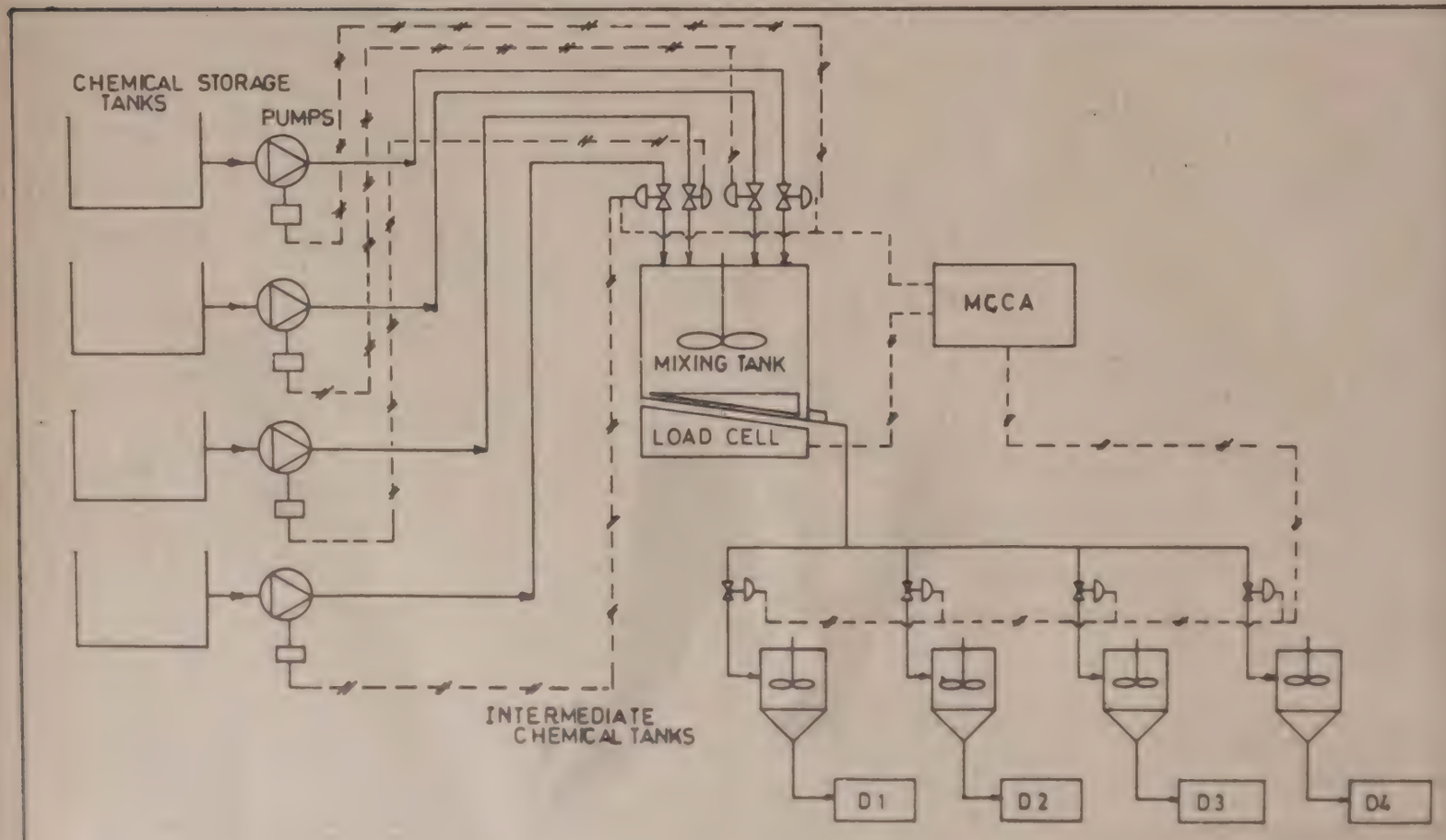


Fig. 9: MICROPROCESSOR CONTROLLED CHEMICAL ADDITION SYSTEM

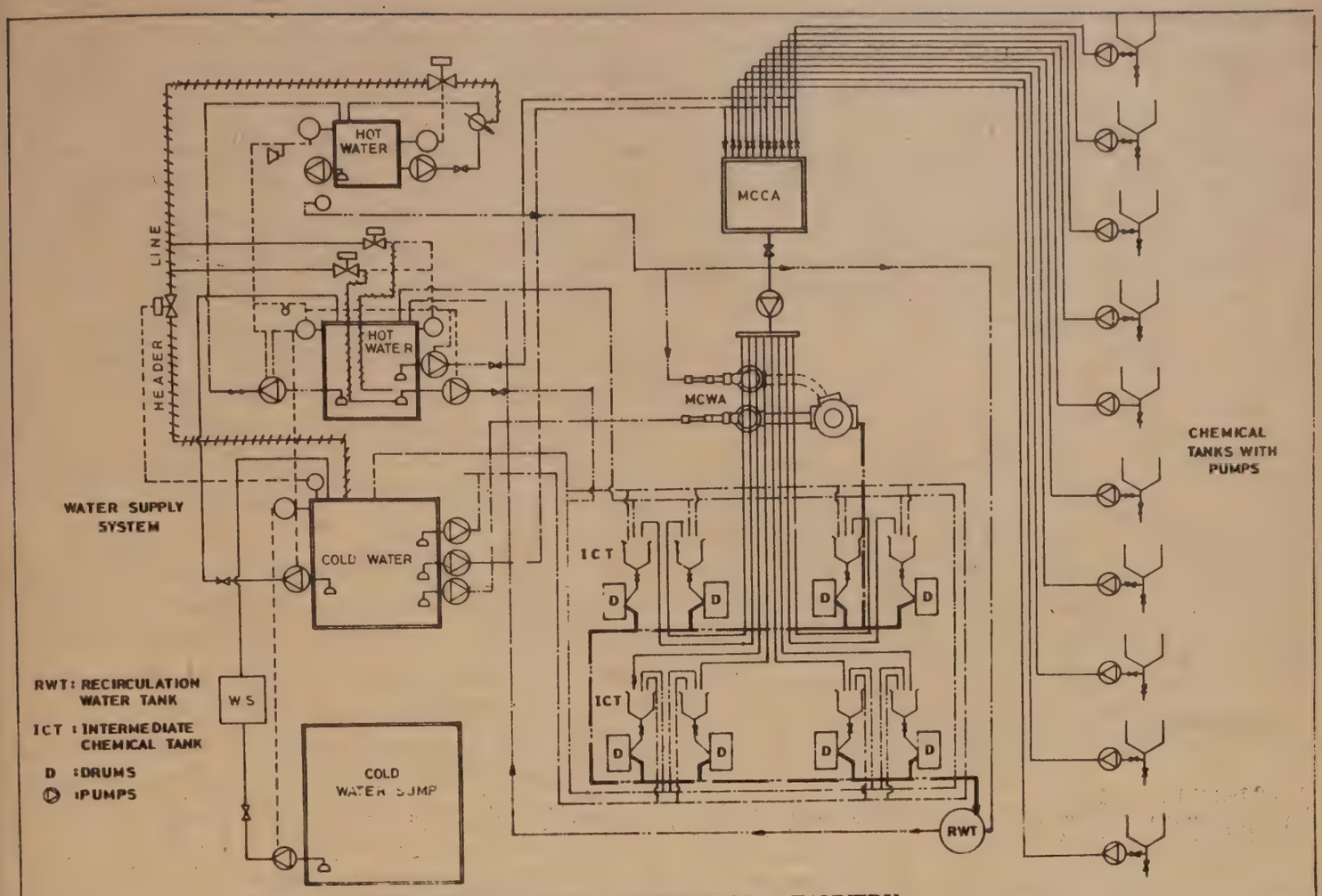


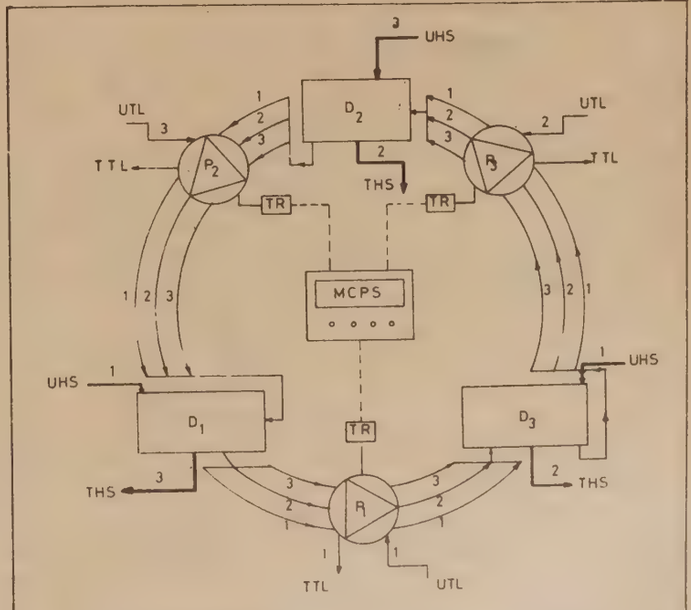
Fig. 10: INTEGRATED MC-CA/WA SYSTEM FOR A TANNERY

tegrated water and chemical addition systems

MCWA and MCCA systems can be integrated to facil-te automatic addition of water and chemicals at any desired mperature and dosage. Piping network for water and chem-l transportation can suitably be rationalised. Fig. 10 shows ypical integrated MC-CA/WA system.

One of the important applications of MC-CA/WA systems n Multistage Tanning Operation (MTO).Investigations on oratory and bench scale levels, have shown that MTO can d to high chrome uptake without any sacrifice of the leather ality. Further investigations are in progress to establish the mmercial viability. In the present Indian context, batch sim-tion of multistage countercurrent operation looks to pos-s greatest potential at the commercial level. Batch simu-ion of a countercurrent cascade is extensively practiced in tallurgical, vegetable tannin and oil industries and it should t be difficult to introduce this concept in leather processing.

If it is to be practiced in chrome tanning process, untanned des/skins have to be brought in contact with the weakest rome solution and the fresh chrome tan liquor has to con-tt the hides/skins which have received maximum chrome. order to avoid physical movement of hides and skins from e drum to another, the arrangement shown in Fig. 11 is ggested for a three stage contact. The hides and skins are charged into a particular drum at a given time and are discharged from the same drum after receiving necessary tan liquor contacts in a countercurrent fashion. With the help of a Microprocessor Controlled Pumping System (MCPS), the liquor transfers can be automated from one drum to another



TR - TRANSMITTER
MCPS - MICROPROSSOR CONTROLLED PUMPING SYSTEM
UHS - UNTREATED HIDES/SKINS
THS - TREATED HIDES/SKINS
UTL - UNTREATED TAN LIQUOR
TTL - TREATED TAN LIQUOR

Fig. 11: MICRO-PROCESSOR CONTROLLED PUMPING SYSTEM FOR MULTI STAGE TANNING

to simulate the counter current multistage contact. The following are the basic features of a three stage arrangement:

1. Liquid transfer from one drum to another is clockwise.
2. Loading/unloading of hides/skins is in anticlock direction.
3. Each pump discharges fully treated (effluent) tan liquor from its parent drum and charges the fresh tan liquor to the next recipient drum once in three contacts in a particular cycle. During rest of the contacts, it merely transfers tan liquor from its parent drum to the next drum.
4. Pump actions are controlled by timers linked with the microprocessor system.

The limitations of batch simulation multistage contact processes are (1) they are not suited to tanneries which employ multiple process recipes to produce different types of leathers and (2) they have to undergo certain number of cyclic operations before attaining a state of steadiness. They are however, most suitable for tanneries engaged in large scale manufacture of certain types of leathers.

PROCESS CONTROL IN DRUM OPERATION

Given the pressing ecological demands and the urgent need to save on chemicals, it has become imperative to control the drum operations more precisely than hitherto practiced. The following areas require attention:

1. Drum function control
2. Recycling of tan liquor
3. pH control.

Drum speed, direction of rotation and positioning can controlled by electronic instrumentation. It is possible to h four adjustable speeds (forward and backward), automa change of direction of rotation with the help of timers a a magnetic limit switch for the proper drum positioning w the draining valve at the lowest position. A safety interlo system can also be provided to the drum. Pneumatically co trolled drawing and recycling valves can be incorporated control the tan liquor recycle and discharge. A centrifu recycling pump can be incorporated with necessary mo speed control for adjustment of recycle rate.

Instrumentation for pH measurement and control is amo the most widely used process measurement devices in che ical industry. Rugged electrode systems and high sensiti electronic circuits are commercially available for applicati in tannery drums. The primary detecting element in pH me surement is the glass electrode. A potential is developed the pH sensitive glass memebrane due to differences hydrogen ion activity in the sample and a standard soluti contained within the electrode. This potential measured re ative to the potential of the reference electrode gives a vo age which is expressed as pH. A complete pH measuring ar

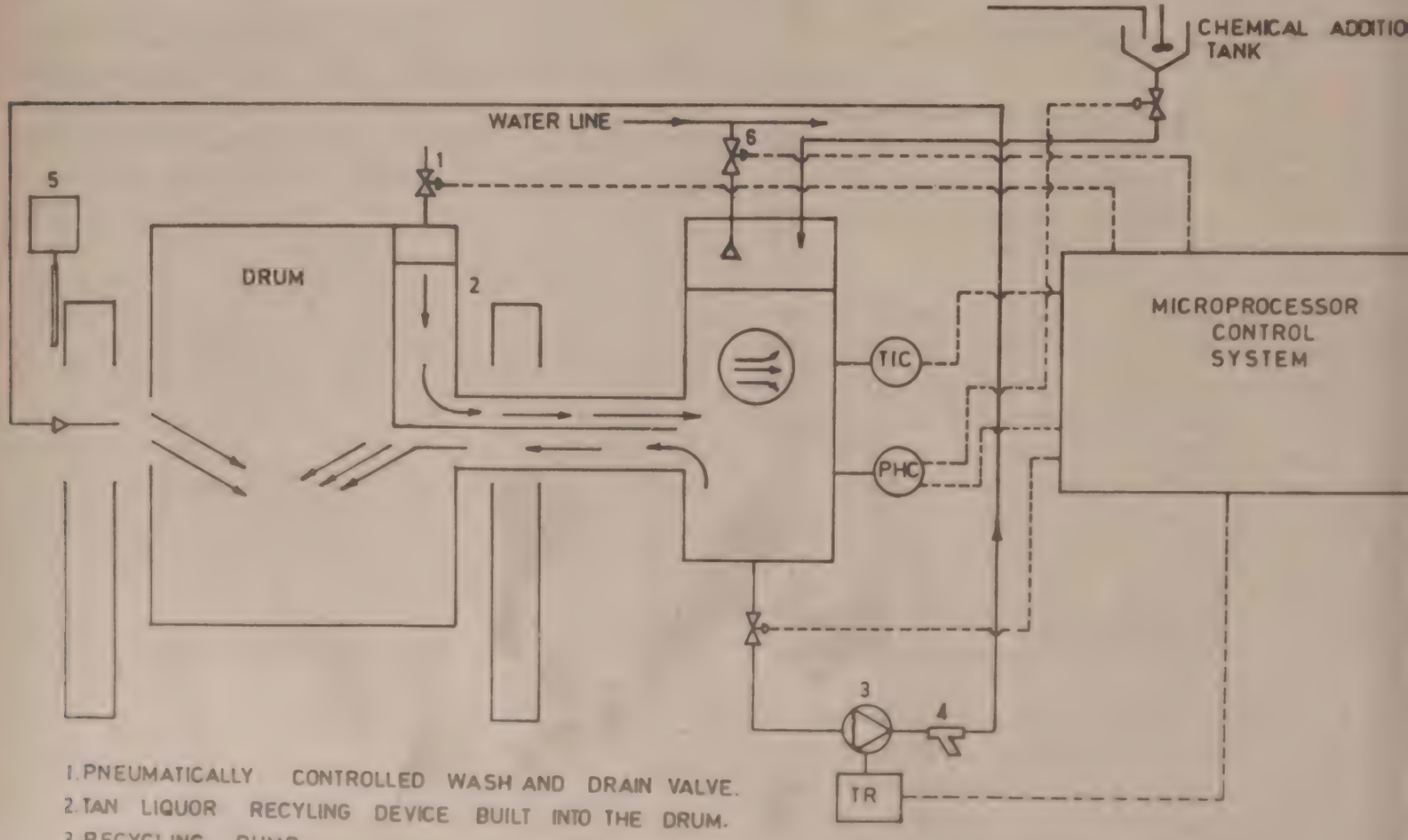


Fig. 12: MICROPROCESSOR CONTROLLED DRUM OPERATIONS

rding device with alarm limits, consisting of two signal acts to set the range within the desired pH value can be rporated as a part of drum operation control instrumen- on.

ig. 12 shows the typical control instruments for a drum nitored by a microprocessor. The advantages of provid- such control systems are:

Control and pinpoint the time at which the process is com- pleted.

More production cycles per day.

Instant mixing of chemicals with the float.

Precise control of process parameters like temperature and pH.

Consistent quality of the leather.

Quicker draining and washing.

Recovery and reuse of expended float.

Better solid-liquid contact through the manipulation of drum rotation and its direction.

CONCLUSION

By incorporating appropriate process control instrumentation, it is possible to introduce new processing methods and to reorganise the process sequences or chemical formulations in the tanning operations. The need for control instrumentation in the leather processing sector arises not only to achieve technical excellence but also to gain economic and financial advantages in the highly competitive world of leather.

ACKNOWLEDGEMENT

The author expresses his gratitude to Dr. R.B. Mitra, Director, Central Leather Research Institute for his encouragement to publish this work. His thanks are due to Shri M.R. Sridharan for the steam and other calculations and Dr. P.R. Patnaik, Shri H. Purushotham and their colleagues in Chemical Engineering Division for their useful suggestions. A word of appreciation to Shri K.R. Radhakrishnan for the careful typing of the manuscript and Messrs. K. Sesha Sai, L. Subramanyam, P. Pushpanathan and Mrs. V. Rajyalakshmi for preparing the drawings.

Table - 1

OPTIONS FOR TANNERY WATER HEATING

HEATED BATCH STORAGE SYSTEMS

-- Systems too large
-- Helps in steam cushioning
-- Need automatic mixers
  * Steam-Cold water
  * Hot water-Cold water
-- Non conventional energy can be employed

ON LINE WATER HEATERS

Immersed tube heaters	Heat exchanger with a large heat output	Electrical heaters
-- High heat transfer capacity	-- Response time very short (< 30 sec)	-- High power consumption
-- Turbulent flow inside tubes	-- High grade control system required	-- More useful as standby
-- Flue gases, fuel gases can be used		
-- Need water storage facility		
-- High grade control system required		

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Phone: 520034/520054
Telex: 72250/71228

What ails Indian leather goods exports

S. NATESAN

Scientist, Leather Goods Division, CLRI.

a's performance in leather goods export is poor in the ld market when compared with other developing coun-s. The share of all developing countries in the world trade eather goods is progressively increasing while India's re is progressively decreasing.

The share of India leather goods in world market
Leather product exports

veloping untries	Exports (in million US $)	Total Developing country exports (Percentage)
Republic of Korea	668	43.0
Hongkong	229	14.7
Brazil	208	13.4
Uruguay	72	4.6
Argentina	59	3.8
India	48	3.1
Taiwan	43	2.8

ource: UNIDO 29.11.1979 - p/214 -- Worldwide study of e leather and leather products industry -- second draft.

ercentage of share in the global market with developed countries

	1985	Million US $	Percentage
. Leather Handbags	World	1403	
	India	50	3.56
. Travel goods-	World	388	
toilet cases	India	-	
. Satchels &	World	143	
Briefcases	India	-	
. Travel bags	World	794	-
	India		
. Leather garments	World	2238	
	India	14	0.63

From the statistics furnished above, India's share is very ow at the global level. This will be a paradox when we real-se that our country produces huge amount of raw skins. What are the causes for this ailment? On analysis with facts and figures, we can clearly see the two major areas which are affecting the export performance of Indian goods industries. They are (1) lack of skilled artisans and (2) lack of effective quality control system.

Skilled artisans

The difference between skilled artisans and unskilled artisans is little realised. A skilled artisan must possesss (i) knowledge about various types of leathers and their suitability to fabricate fashionable leathers goods (ii) knowledge about various types of accessories and their function in leather products (iii) knowledge about simple and precision tools and their use in making novelty goods (iv) knowledge about assembling the components with modern techniques and (v) handling and packaging techniques.

Cause for poor quality and poor performance in export

Most of the leather industries in our country have engaged traditional artisans who are lacking in modern techniques and technology developments. They may not have the ability to understand and absorb changes easily. They have their own ideas in clicking leathers, fixing accessories, assembling components and stitching the products. For example, giving more allowance while clicking components, using crude methods while fixing the accessories, unscientific approach while assembling the components and not adhering to the principles of sewing while stitching the products are some of the qualities of the traditional artisans. This has resulted in (i) enormous wastage of leathers (ii) improper function of the accessories (iii) defective assembly and (iv) poor performance in stitching and finishing. So, the end products becomes substandard in quality. In addition to that, the gap between production planning and ultimate production execution is stretched with the result, there are time or cost over runs or both making the cost go haywire. The industries are therefore finding it extremely difficult to compete with other developing countries in the global trade due to low quality and high price.

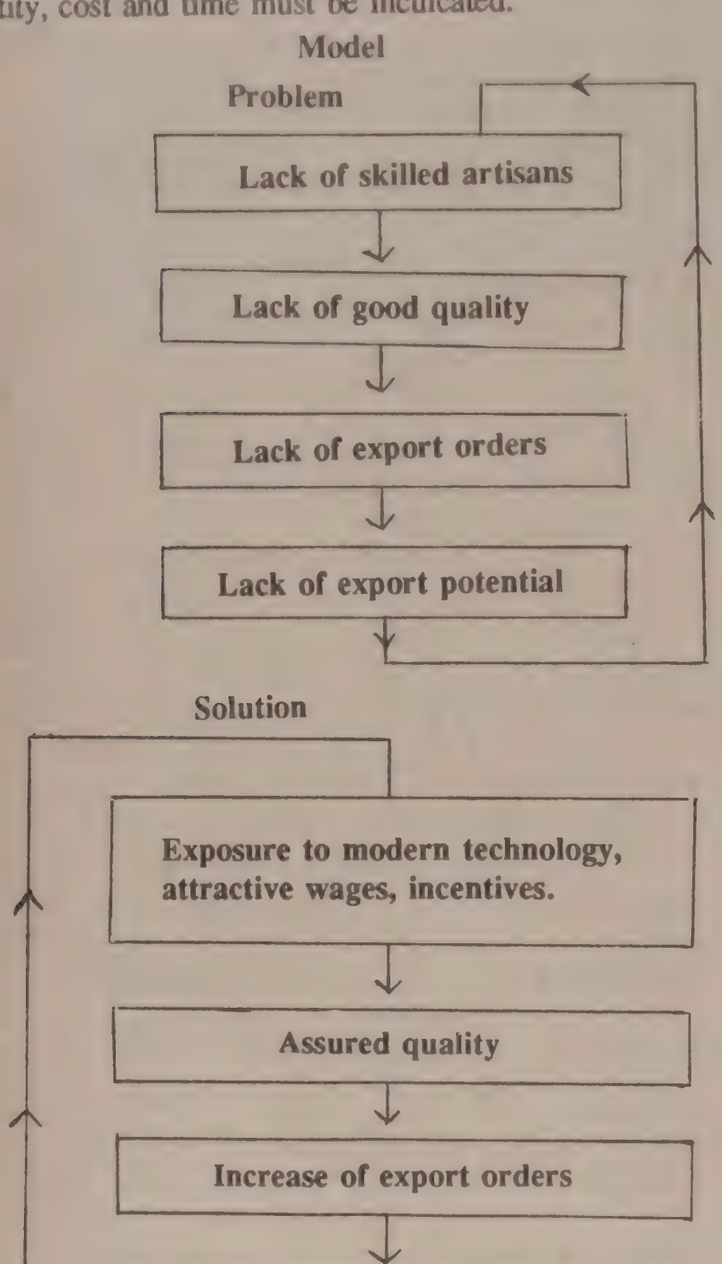
Solution for improving the quality and performance in export:

1. Modern training centres must be opened both in urban and rural areas for imparting training to the artisans in various fields such as (i) basic technology of leather (ii) clicking techniques (iii) fittings and their functions (iv) use of simple and sophisticated tools (v) use of electronically controlled production process (vi) operating sophisticated and computer aided machinery and (vii) packaging and handling techniques of leather products.

2. Wage structures of artisans must be made attractive to opt for this career.

3. Highly rewarding competition among the artisans of finished leather products must be organised and their achievements must be given wide publicity.

4. A sense of value on the four dimensions of quality, quantity, cost and time must be inculcated.



(ii) Lack of effective quality controlled systems:

What is quality?

Increasing demands of the export market and stiff competition of the internal industries have brought the need for quality. Efficiency in production is not merely determined by volume, but the quality that determines the demand for export. Conformance to specification, high quality raw materials and attractiveness of the product finish are the main features of quality products. If a product gives service for a considerable time, then it is said to reliable in quality.

It is very important to make goods within the specification limits established for it. This statement is particularly true in the sale of garments, where the specification is of crucial importance to the buyer. Although some tolerances are permissible, the garments of a certain size become u if the sizes vary beyond a certain limit.

What are the causes for poor quality:

1. Use of substandard raw materials: Grain defect skin reduce the richness of the design. Substandard affect the function of the product.

2. Lack of knowledge in fabricating techniques: Fail the good surface for the visual parts and defective s for the non-visual parts; fail to click the tough parts fr back of the skin and the soft parts from the belly of th not staining the cut edges; fail to use gadgets for fixing fail to use appropriate tools for fixing fittings; fail to re excess adhesives; fail to stitch without guides, trimmi folded edges after stitching; fail to operate sophist machinery for specific jobs etc.

3. Poor supervision: Lack of knowledge in produ planning and execution; fail to detect errors durin sequence of operation and rectify them immediately

4. Lack of knowledge about modern tools, equipmen machinery: Fail to produce quality goods due to imp handling of tools, equipment and machinery.

5. Poor maintenance of machinery: Frequent breakd resulting in dislocation of production schedule, vital pa the machinery become worn out and machinery bec unserviceable.

Diagramatic illustration is given in the following pag

Solution

1. Providing adequate training on modern lines of pro tion at all levels from bench to top.

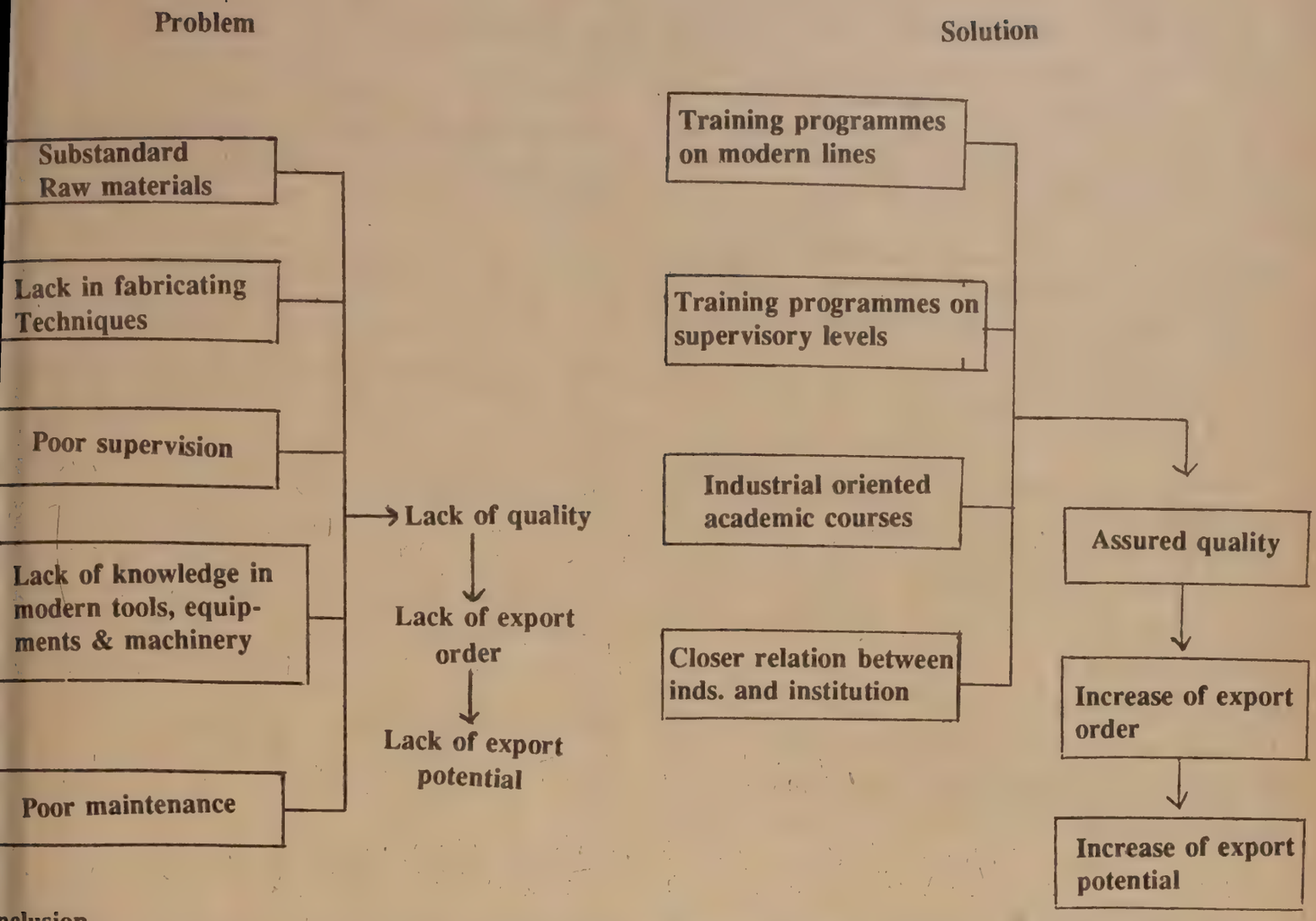
2. Special programmes for the training and develop of foremen and supervisors must be based upon product increase and quality supervision.

3. Specialised training must be given in operation maintenance of various simple and sophisticated machi

4. Scientific and technical colleges must offer numb courses at different levels and fields which should be ficient to meet industrial requirements.

5. Training, programming and control of automated computer aided machinery.

6. There should be closer co-operation between trai institutions and industries in the implementation of trai programmes.



nclusion

The important ailments in today's Indian leather goods ort are lack of skilled artisan and lack of quality control chanism. An awareness of the above two factors should created amongst all the concerned and drastic remedial measure should be instituted which alone will enable the Indian Leather goods export industries to break away from the vicious circle and play its due and prominent role in the export earnings of our country.

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LEATHER NEWS

LEATHER COUNCIL DRAWS UP PLAN TO HIT EXPORT TARGET

The Leather Export Promotion Council has chalked out an ambitious programme for achieving the export target of Rs. 1,600 crores this year, official sources said. This includes participation in international trade fairs, organising buyer-seller meets abroad and international publicity of Indian leather products.

Production of finished leather and various value-added products has increased substantially during the year 1989-90 and a major portion of this has been exported, sources said. The exports reached an all-time high of Rs. 1,244 crores during 1987-88 compared to Rs. 930 crores during 1986-87 for the industry as a whole.

Nearly 50 per cent of the exports are in the form of value-added products like shoe uppers, leather footwear, leather garments and other leather goods. Small-scale units had contributed substantially in the overall export of leather products, sources said.

Special emphasis was laid during the current year on bringing about modernisation and technology upgradation of the leather industry. Priority was given to prototype development of machinery and equipment required for footwear and leather goods industry.

A set of improved hand-tool kits was developed for use by small-scale units and cobblers. The footwear industry has been selected as a thrust area during the Seventh Plan period to encourage production and increase their exports.

Sources said to promote standardisation in the industry, a few thrust areas in leather, footwear, leather goods and leather garments have been identified and efforts will be made to prepare standards on priority basis for promotion of exports and ensure safety.

An International Labour Organisation mission after study of the decentralised footwear industry in different parts of the country has shown interest in restructuring the industry by providing assistance in the areas of design technology, training, marketing and management systems.

A tripartite study group after detailed study has made final recommendations in improving the working and living conditions of leather workers. The format duly completed was sent to the Ministry of Labour requesting for grant-in- machines for Central Footwear training centres in Ag Madras, they said.

The State Governments of West Bengal and Maha have agreed to set up footwear training centres at C and Bombay respectively with financial assistance f centre towards capital cost of building, machinery and ment.

The state leather development corporations have asked to assist small-scale tanneries in setting up co effluent treatment plants for pollution control. Consid progress had been made in setting up such plants in Nadu, sources said.

TRAINING PROGRAMME ON LEATHER GARM MANUFACTURING

The National Institute of Fashion Technology (NIFT), Delhi and the Council for Leather Exports (CLE) M jointly organised a training programme for 10 days in M to provide training in basic pattern making for leather ment manufacture from 10.4.89 to 21.4.89. The training provided by Mrs. Gail Ainge, an UK national who is a cialist in pattern making.

India's export of leather garments has shown phenom rise in the past few years. From a modest export of R crores in 1983-84, India's export of leather garments rea an all time high of Rs. 105 crores in 1987-88 and in 198 according to present indications, export of leather garm from India exceeded Rs. 150 crores. This has become of the fastest growing sectors in the leather industry. Th our growth in terms of value and volume is indeed a h sign it has been noticed that there is an acute dearth of ified technical personnel, particularly in the field of de pattern making.

A good garment requires a good pattern maker. Any d in pattern making will be reflected in the drape of the ment and its other characteristics. Even established gar manufacturers in India are conscious of this fact and this evident in the fact that some of the leading manufactu of garments had deputed their pattern makers to the trai programme conducted in the premises of the Council Leather Exports. A similar programme is proposed t organised jointly by NIFT and CLE at Delhi sometim the month of September 1989.

Council for Leather Exports is also planning to orga- exclusive training programme on design and pattern g for leather garments for a period of 3 to 4 months so od grounding can be given to the leather garment ma- the basics of design/pattern making. The cooperation T has been solicited in this regard. NIFT has also been ted by the Ministry of Commerce, Govt. of India to e leather garments as one of their sections for regular g in design. In the long term, such training will enable porters to discard dependence on buyers for designs etc.

BSM IN RIYADH PROVES A SUCCESS

e Council for Leather Exports in close collaboration with mbassy of India at Riyadh had organised a Buyer Seller for leather and leather products at Riyadh, Saudi Arabia 18th to 21st of March, 1989. There were 10 parties from er India who participated in this meet. The meet proved a big draw not only with regard to generating demand rders for our leather products but also helped in explor- ollaborations with Arab tanners for exploiting the raw ial resources available in Saudi Arabia in plenty. In the r Seller Meet business worth of Rs. 2.5 million of our er products was transacted and eventually, business esti- d at Rs. 10 million may result. The export potential for s, especially safety and industrial shoes, leather goods nand bags, wallets and brief cases is good. There is also growing demand for leather garments. Saudi Arabia has witnessed remarkable growth in the past one decade and many departmental stores along the lines of the European and the American stores are coming up.

Our presence ought to be felt in a bigger way by more publicity and establishing one-to-one contacts. The Council is proposing Buyer Seller Meets in various places at frequent intervals to expose our products in these markets. Participation in various fairs being organised in this country will also be considered.

Besides marketing leather products, there is considerable scope for exploiting the rich raw material wealth, i.e. hides & skins that is available in Saudi Arabia. Our competitors like, Taiwan, Spain, France and Italy have already made a significant dent in this market but our country can also think of joining hands with the Arab tanners to form joint ventures in making semi-finished and finished leather for Indian market.

The Council for Leather Exports was represented by its Deputy Director, Shri T. Ataur Rahman in the Buyer Seller Meet. The Saudi Government is coming up with various measures for promoting their export in more value added form and for this the Arabs are seeking help from Indian entrepreneurs. This is an opportune time for India to join hands with them for exploiting their raw material resources and to enter this market in a meaningful way.

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BARABANKI (U.P.)

ABSTRACTS

New technologies available for inplant process control in tanneries. M. Aloy, ***Leather,*** **191,** (4566) 143, 1989.

Modern production methods have forced tanneries to accept increasingly accurate control methodology. Although process control techniques were slow to take off, they have become omnipresent in every stage of production. The most recent developments mainly concern the wet stage and its processing, sorting and mechanical operations (mainly splitting and shaving) with trimming, finishing and area measurement. The new technologies applied to the various process stages are generally computerised and have provided for greater potential for control so that the tanner can now run his company effectively.

Self cross-linking water based top-coat system. K. Van Duren and W. Szabo, ***Leather,*** **191,** (4566) 159, 1989.

Due to increasing concern regarding environmental pollution a considerable amount of research work has been carried out to reduce the emission of hazardous substances in the leather industry. This paper presents an account on the use of crosslinks like formaldehyde, melamine, and epoxide resins, carbodiimide or aziridine in water based finishes in the place of organic solvents. With the new system, all the machines commonly used in leather finishing can be employed. Only the plating temperature may have to be adjusted due to the higher thermoplasticity of the system. A further advantage is that in contrast to solvent lacquers no additional processing is required to increase the final physical properties of the top coat.

Investigation of the mechanism of the reactions of acrylic resin tannage with chrome leather. Li Sheng, Wei Dequing, Lu Zonghui, Zhang Shuying and Zhang Xinmng, ***J. Am. Leath. Chem. Assoc.*** **84,** 79, 1989.

Acrylic resin tanning (ART) has been carried and the results obtained by using IR, DSC, X-ray diffraction, electron microscopy and dynamic viscoelastic spectroscopy to examine retanned and non-retanned specimens showed that ART coordinated with the chromium of chrome leather by its own carboxyl groups, that ART made two peaks of DSC curves disappear and that leather fibres retanned by ART, due to the filling effect of ART on the fibres, produced leather which felt soft and round.

A novel process for making patent leather. F. Scholnick and P.R. Buechler. ***J. Am. Leath. Chem. Assoc.*** **84,** 65, 1989.

Radiation curable formulations have been develop use in preparation of finishes suitable for patent lea curing can be achieved by either ultraviolet or electron irradiation. In contrast to conventional methods, cor finish application is obtained rapidly without the use o ing ovens, and with no air pollution.

Patent leather produced by this process exhibits good and flexibility and excellent abrasion resistance. Flex was affected by the type and amount of cross linking incorporated into the coating as well as by the acrylate thane oligomer used as the coating backbone. The effe varying the formulation on final finish properties ar cussed.

Enzymatic treatment of offal from flushing mach M.M. Taylor, E.J. Diefendrof, T.A. Foglia, D.G. Baile S.H. Feairheller. ***J. Am. Leath. Chem. Assoc.*** **84,** 71,

It has been demonstrated that offal generated from f ing machines can be treated enzymatically at low ten atures and in a relatively short time to give by-products w have potential value to the chemical industry. The diges are carried out with commercially available protec enzymes at 40°C for 3 hours and then 60°C for 1 hour. 87% of the available fat was recovered as well as a re separated protein hydrolysate fraction.

Chemical analysis showed that the fat contained 0.2-(free fatty acid depending on the treatment. The results gest that with a small investment in enzymes a good qu fat can be obtained from flushings which will convert a waste disposal problem into a value added by-produc

SHOE CARE

Six new products were introduced by Dasco at the Br Foot Wear Fair. Four of the new products form the foot c fort range, a range of foot care products aimed at active pe whose feet need extra cushioning and support. The prod -- Heel cushion, Ball of Foot cushion, Insole Ball of cushion and Arch cushion -- are made from soft na leather and shock absorbing latex.

All the products in the range are easy to use -- simpl peeling off a backing paper to reveal an adhesive patch, w makes sure the cushion stays fitted snugly in the shoe

Shoe & Leather News. 4040,

CHEMICAL WEEKLY BUYER'S GUIDE

EIGHTH EDITION

Four years after the publication of our last ***CHEMICAL WEEKLY BUYER'S GUIDE,*** *(Seventh Edition)* we at **SEVAK PUBLICATIONS,** are pleased to announce our plans for publication of the Eighth Edition.

The last four years have seen a considerable growth in the chemical industry, both in terms of size and range of products manufactured, traded or imported. Consequent to such a growth has arisen an imperative need for a systematic source-book to detail the activities of the industry all over the country.

The ***CHEMICAL WEEKLY BUYER'S GUIDE, EIGHTH EDITION*** coming in the tradition of seven previous editions strives to fill this gap.

A glance at the proposed list of contents will reveal that the ***GUIDE*** will be a valuable reference book to all those involved in the industry be it in manufacturing or trading.

As a forum for advertising your activities the ***GUIDE*** will remain unsurpassed. The tariff rate for advertising in the ***GUIDE*** is detailed in the last page of the brochure.

We request you to reserve the space required by you and send us the material for your advertisement at the earliest to enable us to give it a position of vantage.

PROPOSED LIST OF CONTENTS

The ***BUYER'S GUIDE*** will include comprehensive listings of:

* Chemical Manufacturers
* Chemical Dealers
* Indenting Agents

All the above will be suitably and conveniently indexed so as to permit easy and rapid access to information.

In addition, it is also proposed to cover the following:

* Chemical Plant & Equipment Manufacturers
* Consulting Engineering Firms
* Instrument Manufacturers
* Instrument Dealers
* Associations and their members
* Items reserved for small scale sector
* Journals & Periodicals
* Educational Institutions
* Indian Standards
* N.R.D.C. Processes available for commercialisation
* R & D Units recognised by the Department of Science & Technology
* Major chemical manufacturers worldwide and particularly in U.S., Europe and Japan.

CHEMICAL WEEKLY BUYER'S GUIDE EIGHTH EDITION

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To

The Advertisement Manager,
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SEVAK PUBLICATIONS,
306, Shri Hanuman Indl. Estate, G.D. Ambekar Road,
Wadala, Bombay 400 031.

Dear Sirs,

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Yours faithfully,

(Signature with stamp)

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CHEMICAL WEEKLY BUYER'S GUIDE

EIGHTH EDITION

SEVAK PUBLICATIONS

306, Shri Hanuman Industrial Estate, G.D. Ambekar Road, P.B. No. 7110, Wadala, Bombay 400 031.

Plans are now afoot to bring out the Eighth Edition of our **CHEMICAL WEEKLY BUYER'S GUIDE.** Among the many features being planned is a comprehensive listing of manufacturers/dealers/indenting agents of chemical and allied products, chemical plant & equipment, instruments, machinery etc. To make the **BUYER'S GUIDE** an authentic source-book we seek your co-operation. Kindly fill in this questionnaire and return it to the address shown above, as early as possible. **PUBLICATION OF YOUR ENTRY IN THE BUYER'S GUIDE IS ENTIRELY FREE AND WITHOUT ANY OBLIGATION.** When filling up this questionnaire be as detailed as you please. For convenience of indexing do not use abbreviations for chemicals and use only generic names. Trade names where mentioned should be accompanied by generic names. If space in this form seems insufficient do not hesitate to give details separately.

ENTRY FORM FOR MANUFACTURERS/DEALERS/INDENTING AGENTS

(Select appropriate one)

Name of Unit :

Office Address (with Telephone & Telex numbers and Telegraphic Address) :

Factory Address (with Telephone & Telex numbers and Telegraphic Address) :

Branches :

Established in :

Foreign Collaboration/Associates if any :

Products (Trade names if mentioned should have the corresponding generic name alongwith. Dealers are requested to restrict entry so as to include their major items) :

Installed Capacity :
(Item-wise in tonnes per annum)

Production in Last Financial Year :
(Item-wise in tonnes per annum)

Exports if any :
(with details of country exported to, quantity, value etc.)

Raw Materials Required :
(Item-wise in tonnes per annum)

For Dealers only :
Acting as stockists for :

Executives :

Any other relevant information :
(Membership of Associations/Awards etc.)

MARKET INFORMATION

Butyl Carbitol Shoots

yl carbitol went up to Rs. 105 g. Cresylic acid moved up by to Rs. 52. Citric acid stabilised . 46. Titanium dioxide conti- to rise and anatase was d at Rs. 107 per kg and rutile at Rs. 120 per kg. In solvents n basic prices of benzene went Rs. 11, toluene to Rs. 21 and xylene to Rs. 18. Aniline oil continued to remain light and was quoted at Rs. 65 per kg. Melamine came down to Rs. 60 per kg while styrene monomer was down to Rs. 41. In the dyes intermediates section, anthranilic acid went up by Rs. 5 to Rs. 80 per kg and tobias acid up by Rs. 10 to Rs. 155 per kg.

We cannot guarantee the accuracy of the prices published in CHEMICAL WEEKLY as they are based only on the enquiries made by our correspondent –and, as such they are not FIRM PRICES as between a buyer and seller. The prices are published only with a view to giving some ideas of the market conditions.

The prices are inclusive of Excise and Maharashtra Sales Tax.

(Prices as on May 22, 1989)

STRIAL CHEMICALS	Per Kg.
onium sulphate	2.00
onium phosphate (Mono)	14.50
onium phosphate (Di)	12.00
onium carbonate (Di)	17.00
onium bicarbonate	5.60
onium chloride	3.00
onium nitrate	6.50
nic white powder	23.00
amide (Resale)	68.00
m carbonate	6.00
ching powder (33% Cl)	4.20
Borax (Granular)	15.00
Borax (Powder)	15.25
Boric acid (Tech)	23.00
Bisphenol-A	70.00
Butyl carbitol	105.00
Caustic soda (Flakes)	13.00
Caustic soda (Solid)	13.00
Caustic soda (Lye)	7.00
Calcium chloride 70% (Solid)	3.25
Calcium chloride 75-80%(fused)	3.50
Calcium chloride 36% (Anhydrous)	5.00
Calcium carbonate (precipitated)	4.25
Calcium carbonate (Activated)	4.75
Cobalt oxide	280.00
Cresylic acid	52.00
Camphor (Indian)	105.00
Cream of Tartar (Tech.)	70.00
Citric acid (Belgium) (Resale)	48.00
Citric acid (Indian) (Resale)	46.00
Copper sulphate	24.00
Chromic acid	61.00
Ethylene urea	58.00
Ferric chloride (Lumps)	5.50
Ferric chloride (Anhydrous)	16.00
Glue flakes	15.00
Glue sheets	6.75
Gohsenol GH-17	112+ST
Hydro	40+ST

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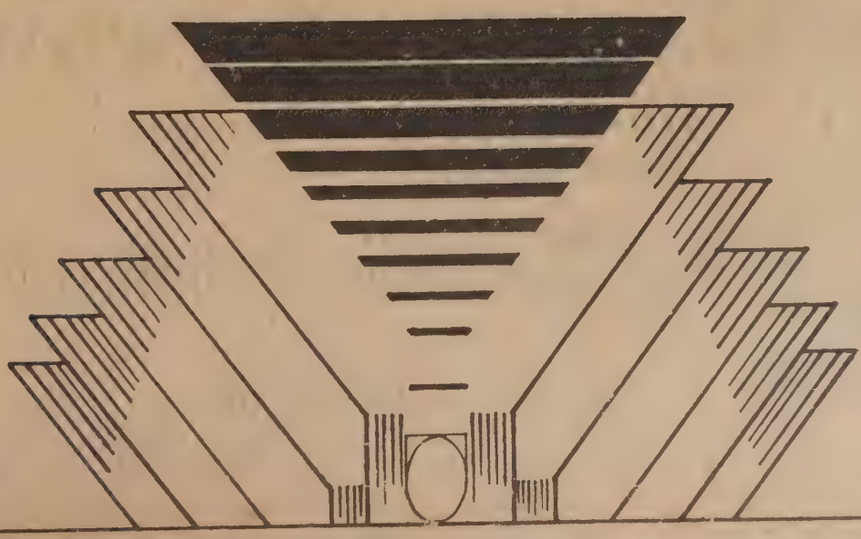

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Hyflosupercell	18+ST
Hexamine (Resale)	34.00
Industrial Wax	25.00
Litharge	40.00
Lead Acetate (Tech.)	31.25
Lithopone	18+ST
Magnesium chloride (Crystal)	1.25+ST
Menthol crystal (Flakes)	900+Ex+ST
Menthol bold	665+Ex+ST
Menthol crystal cold	700+Ex+ST
Magnesium carbonate (Japan)	16.00
Magnesium carbonate (Indian)	18.00
Maleic Anhydride (Resale)	37.00
Mercury (175 lbs)	13,000.00
Nickel chloride	110.00
Oxalic acid (Resale)	24.00
Peppermint oil (Rectified)	195+Ex+ST
Potassium carbonate (Indian)	24.00
Potassium carbonate (Imported)	24.00
Potassium bichromate	27+ST
Potassium phosphate (Mono)	14.00
Potassium phosphate (Di)	14.00
Polyvinyl alcohol (No. 117)	120+ST
Polyvinyl alcohol (No. 173)	140+ST
Polyvinyl alcohol (No. 208)	150+ST
Paraformaldehyde (Resale)	22+ST
Phthalic anhydride 36% (Resale)	29.00
Pentaerythritol (Resale)	45.00
Paraffin wax	18+ST
Rangolite (German)	80+ST
Rangolite (Czech.)	70+ST
Sodium sulphate (Fine)	6.00
Sodium sulphate (Coarse)	5.00
Sodium sulphide 50-52% (Flakes)	11+ST
Sodium sulphide 58-60% (Flakes) (TCL)	20.00
Sodium sulphide pure (Flakes)	12.25
Sodium nitrite (Resale) per 50 kg.	680.00
Sodium chlorite 80% (Spain)	88.00
Soda Ash (Tata)	5.00
Soda Ash (Birla)	4.50
Soda Ash (Imp.)	4.50
Sodium bicarbonate	7.50
Sodium bisulphite	4.50
Sodium silicate	3.00
Sodium acetate	5.00
Sodium alginate	240+ST
Titanium Dioxide (Anatase)	107.00
Titanium Dioxide (Rutile – RCR_2)	120.00
Tartaric acid	102.00
Trisodium phosphate	5.50
Thiourea	80+ST
Urea (Tech.)	2.90
Vacuum salt	1.00
Zinc Dust	32.00
Zinc Oxide	50.00
Zinc chloride powder (Tech.)	12.50
Zinc sulphate	7.00

SOLVENTS	Per Kg.
Acetic Acid Glacial (Resale)	14.50
Acetic Anhydride (Resale)	31.50
Acetone (Resale)	16.50
Adipic Acid	57.00
Aceto Acetanilide	55.00
Aniline Oil	65.00
Benzoate Plasticiser	62.00
Butyl acrylate	78+ST
Butyl stearate	35.00
Butanol	3
Benzyl Alcohol	
Benzyl Chloride	
Benzo trichloride	
Benzoyl chloride	
Bromine Liquid	
Chloroform	3
Carbon Tetrachloride	2
Cellosolve	56
Cyclohexanone	56
Cyclohexanol	5
Diacetone (Resale)	3
Diethyl Oxalate	3
Diethyl glycol (DEG)	45
Dioctyl Phthalate	4
Diallyl Phthalate	5
Dimethyl Phthalate	2
Dioctyl Adipate	5
Dibutyl Adipate	4
Dipentene	15
Dimethylamine 40%	12
Dimethylamine 50%	14
Ethyl Acetate	20
Ethyl Acrylate	65
Ethylene Dichloride	16
Ethylene Glycol	46+
Formic Acid (Imp.)	28.00+
Formaldehyde (Resale)	7
Glycerine (CP)	55
Glycerine (IW)	50
Hydrogen Peroxide 50% (Resale)	27
Isopropyl Alcohol	28
Isobutyl Alcohol (Resale)	30
Monoethanolamine (Resale)	61
Melamine	60+
Methyl Ethyl Ketone	48
Methyl Isobutyl Ketone	42
Methyl Acrylate	42
Methyl Dichlcride (Resale)	26

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COPPER SULPHATE IP
DRIED ALUMINIUM HYDROXIDE IP
MAGNESIUM HYDROXIDE POWDER IP
ZINC CARBONATE
AND OTHER LABORATORY CHEMICALS

Contact Manufacturers & Exporters:

ARUN INDUSTRIES

303-A, Vrindavan, Ramachandra Lane, Malad (West), Bombay-400 064.
Phone: Office: 6820559/6820422 Telex: 011-78081 ARUN IN
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ZINC SULPHATE
COPPER SULPHATE
FLOURSPAR
BENTONITE POWDER
RED OXIDE
LIME STONE
CHINA CLAY
DOLOMITE POWDER
TITANIUM DIOXIDE
CITRIC ACID

Enquiries will be solicited preferably in writing:
Contact:

JAI ARAVALI CORPORATION

MINES OWNER, STOCKIST & SUPPLIER OF MINERALS & CHEMICALS
29, Khadak Street, Room No. 36, 3rd Floor,
Masjid Bunder Road, Bombay-400 009.
Phone: 8722563/868009.

Carbitol	68+ST
Meta Cresol	45.00
Nitrobenzene	30.50
Nitric Acid (Conc.) (RCF)	2.50
Ortho Cresol	30+ST
Phenol (Resale)	38.00
Propylene Glycol	52+ST
Polyethylene Glycol (No.200)	52.00
Polyethylene Glycol (No.400)	54.00
Polyethylene Glycol (No.500)	42.00
Polyethylene Glycol (No.1600)	14.00
Polyethylene Glycol (No.4000)	38.00
Polyethylene Glycol (No.6000)	50.00
Para Cresol	40.00
Styrene Monomer	41.00
Sorbitol	15.00
Sulphuric Acid	2.80
Trichloroethylene	29.50
Triethanolamine (Resale)	65.00
Turpentine Oil (Germany)	8.00
Turkey Red Oil (50%)	20.00
Vinyl Acetate Monomer	47.50

SOLVENTS	Per Litre
Benzene	11.00
N-Heptane	10.50
N-Hexane	12.00
Methanol	9.00
Solvent Naphtha Heavy	10.50
Solvent Naphtha Light	8.50
Toluene	21.00
Xylene	18.00

DYES INTERMEDIATES (PRICES ARE WITHOUT TAX AND EXCISE)

Alphanaphthylamine	60.00
Alpha Naphthol (Imp.)	180.00
Aceto Acetic Ester (Methyl)	65.00
Ammonium Molybdate	210.00
Anthraquinone	125.00
Anthranilic Acid	80.00
2-Amino 4-Nitrophenol	135.00
Blue B. Base (Local)	270.00
Beta Naphthol (Atul)	77.00
Benzidine Dihydrochloride (BDH)	98.00
Bromamine Acid	500.00
BON Acid	135+Ex+Ta
Chicago Acid IRS	330.00
Coach Acid	55.00
C. Acid (Imp.)	190.00
Cyanuric Chloride	130.00
2,4- DNCB	30.00
Dihydrothio PTOS (Imp.)	1,000.00
Dimethyl Aniline	73.00
Diethyl Aniline	170.00
Diamino stilbene disulphonic acid	160.00
3,3-DCB (Imp.)	165.00
Gamma Acid (Atul)	195.00
H. Acid (Atul)	150.00
G. Salt	78.00
Isophthalic Acid	45.00
J. Acid	300.00
J. Acid Urea	370.00
K. Acid	123.00
MPDS (German)	185.00
MNA	
Meta Ureido Aniline	
MPD (Local)	
MPD (Japan)	
Naphthenic Acid	
N-Methyl J. Acid	
N-Methyl Aniline	
Naphthalene (Refined)	
Ortho Anisidine (OA) (Imp.)	
Ortho Dichloro Benzene (ODCB)	
OT Base	
Para Dichloro Benzene (PDCB)	
Para Anisidine (PA local)	
PNA	
Para Cresidine (Imp.)	3
Para Amino Azo Benzene (India)	1
PNCB	
Para Amino Acetanilide	1
1-Phenyl 3-Methyl 5-Pyrazolone	1
Phenyl J. Acid	3
Para Amino Benzoic Acid	1
PT Base	1
Rhoduline Acid	52
Resist Salt 80%	3
Resorcinol	19
Sodium Naphthionate	6
5-Sulpho-Anthranilic Acid	8
Sulphanilic Acid	5
Sulpho Tobias Acid	14
Trichloro Benzene (TCB)	2
Tobias Acid	15
Metanilic Acid	5
MTD	12

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OXALIC ACID (Substitute)
TARTARIC ACID (Substitute)
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PARA FORMALDEHYDE 91%
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METHYLENE CHLORIDE 99%
I.P.A. (Original & Distilled)
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THIONYL CHLORIDE

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Please float your enquiries and write for further details to:

M/s. Souvenir Chemicals Pvt. Ltd.

Head Office: F-8, Vatsalya Chembers, 31, Sneh Nagar Main Road, INDORE-452 001
Telex: 0735 349 BNPL IN Phone: 61984/60690
Bombay
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REACTIVE ORANGE HE 2R
REACTIVE GOLDEN YELLOW HER

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DINESH L. THAKKAR

508, Mercury Bldg., Hiranandani Complex, Samrat Nagar Cross Road No. 4, (in) Lokhandwala Complex, Off Four Bungalows, Andheri West, Bombay 400 058. **Phone: 6261728**

Bombay Dyes Market

(Prices as on May 22, 1989)

ACID COLOURS	Per Kg.
Acid Violet 4BS	*190.00
Acid Maroon V	110.00
Acid Orange II	112.55
Acid Orange IIY	93.85
Acid Red A	137.00
Acid Scarlet 3R	128.35
Acid Red 3BN	*195.00
Acid Red R2R	132.00
Acid Red RS	88.00
Acid Patent Blue AS	*280.00
Acid Green V	*375.00
Acid Coomasi Blue	200.00
Acid Yellow 5GN	65.00
Acid Red PG	85.00
Acid Red GRS	78.00
Acid Black 10 BX	157.15
Acid Black BX	126.95
Acid Black Wax	135.50
Crosein Scarlet MOO	200.30
Procinil Yellow GS (ICI, UK)	265.00
Procinil Red GS (ICI, UK)	530.00
Procinil Blue RS (ICI, UK)	315.00
Procinil Scarlet G (ICI, UK)	600.00
Procinil Orange G (ICI, UK)	250.00
Procinil Rubine (ICI, UK)	550.00

* To get resale price add 6% tax.

DIRECT COLOURS	Per Kg.
Yellow 3GX	114.00
Gun Yellow RCH	175.85
Fast Yellow GCH	171.50
Yellow CFG Hly. Conc.	721.00
Fast Yellow GS	126.96
Fast Yellow CHRS	116.85
Viscose Orange A	210.35
Fast Orange GR	171.50
Red	122.65
Dark Tan	98.15
Red IIR	98.15
Red 4B	217.55
Bordeaux BW	170.10
Fast Scarlet 4BS	223.50
Red 12B	220.45
Bordeaux Hly. Conc.	249.20
Cotton Red N	117.05
Fast Helio B	362.85
Brill. Fast Helio 2R	385.85
Brill. Fast Helio 2RS	177.30
Brill. Fast Helio BS	116.10
Brill. Violet Extra	181.45
Blue 2B	102.50
Blue G	220.45
Sky Blue FB	242.00
Copper Blue GR	190.25
Fast Greenish Blue GL	114.60
Developed Black BT	149.95
Blue NB-2B	348.45
Blue NB-2BG	214.70
Developed Black NB-GHB	214.70
Green B	142.75
Green NB-B	218.90
Green 2B-N	218.90
Brown MR	197.40
Brown CN	137.00
Golden Brown G	175.85
Catechin G	155.70
Omega Tan	161.45
Catechin GS	102.80
Black E Hly. Conc.	180.15
Black E Extra Hly. Conc.	180.15
Black NB-ER Hly. Conc.	290.50

DISPERSOL COLOURS	Per Kg.
Red B 3B Conc	611.50
Red B 2B Conc	797.90
Red CB Powder	1048.25
Red D2B Powder	589.85
Violet C 4R Conc.	1202.70
Blue BG Conc	580.65
Blue BN Powder	128.20
Blue D 2R Powder	588.25
Navy BT Conc	531.95
Blue B 2G Conc	577.95
Black BT Conc	319.50
Blue BR	482.40
Yellow 7GL	813.20
Yellow 5RX	269.90
Yellow 3G	473.20
Yellow	140.00
Yellow AL	167.20
Yellow Brown REL	311.70
Yellow FFL	571.40
Gold Yellow GG	320.80
Pink REL	593.00
Red BEL	615.60
Red 2B	4
Red FB	4
Red Violet FBL	6
Orange 3R	2
Violet 3R	3
Violet RL	3
Violet 6R	6
Scarlet RR	2
Rubine 3B	2
Rubine CB	4
Blue GL	4
Blue BGF	8
Navy Blue RE	3
Brown 3REL	2
Black GEL	42
Dark Brown 3B	41

BASE COLOURS	Per
Fast Yellow GC	7
Fast Orange GC	12
Fast Scarlet R	19
Fast Scarlet RC	12
Fast Scarlet RCR	10
Fast Scarlet G	11
Fast Scarlet GN	9
Fast Scarlet GG	7
Fast Scarlet GGS	7
Fast Red B	23
Fast Red RC	11
Fast Red R Flakes	158
Fast Red TR	181
Fast Red TR Oil	223
Fast Red RL	251
Fast Red KB Oil	251
Fast Bordeaux GP	236
Fast Garnet GBC	103
Fast Violet B	548
Fast Blue BB	566

NAPHTHOL COLOURS	Per
ASG	301
AS	205
ASSW	379
ASBS	253
ASBO	266
ASD	209
ASOL	243

	369.00
	336.05
	236.00
	249.95
	2002.35
	2459.45
	143.00
	538.65
	652.60

ION COLOURS	Per Kg.
n Yellow HR	207.95
Yellow H4G	145.65
Yellow H-8GP	168.55
Yellow HE6G	214.75
v G-E4R	276.05
Yellow H7G	332.30
v M4R	275.45
v MGR	387.65
Yellow M4G	201.15
Yellow M8G	366.10
v M3R	244.70
Orange H2R	303.80
Red H7B	157.95
Orange M2R	313.15
Red H8B	213.55
Scarlet H RN	245.05
a Red H-3BP	179.80
Red H-F3B	243.45
Magenta HB	182.00
Red M 5B	160.05
Red M 8B	218.35
Pink MB	137.10
Magenta MB	163.65
Purple H-3R	219.55
Purple H-7R	175.40
Blue H 3R	333.75
Blue H-GR	406.40
Blue H5G	207.95
H 5RX	286.20
Blue H 7G	213.95
Blue H 7RX	358.15
uoise HA	265.05
a Blue H-3RP	595.30
a Turquoise H 2G P	181.50

Blue H-FRD	305.80
Navy Blue H3R	333.75
Blue H 5RX	286.20
Navy Blue M3R	355.70
Brill. Blue MR	405.60
Brill. Blue M RX	214.20
Brill. Blue M-G	226.45
Blue M 4GD	369.40
Navy Blue M RB	341.85
Turquoise M-G	240.30
Brill. Blue M GX	516.25
Blue 3R Acra Powder	718.20
Dark Brown H 6R	248.45
Cobalt Oxide	285.00
Green H4BD	287.00
Green H-E4BI	169.80
Red Brown H IF	143.25
Orange Brown H 28	209.05
Brown M GRN	188.80
Black H-N	314.20

SULPHUR COLOURS	Per Kg.
Navy Blue	210.35
Green G	194.55
Black Grains Extra	72.25
Black Grains OG	73.70
Black GXE Conc.	70.85
Black GXE	57.90
Black GXR	69.40
Black Grains 800	62.80
Black EXR Grains	73.70
Black EXR Grains 800	59.35

VAT COLOURS (ICI)	Per Kg.
Yellow 5G Supra Disperse	561.85
Yellow 5G Acra Conc	818.60
Gold Orange 3G Pdr. Fine	1158.45
Brill. Orange 6R Pdr. Fine	624.35
Gold Orange 3G Supra Disp	693.85
Brill. Orange 6RX Powder	394.30
Brill. Red 3B Pdr. Fine	1214.15
Brill. Red 3B Supra Disp	867.45
Brill. Purple 3R Acra Powder	827.05

Brill. Purple 2R Hly Conc.	744.25
Brill. Purple 4R Supra Disp.	604.25
Brill. Purple 2R Acra Conc.	779.85
Blue 2R Powder Fine	675.30
Blue BC Acra Con Pdr. Fine	1013.15
Blue BC Conc. Pdr. Fine	713.65
Blue R Conc. Pdr. Fine	719.70
Blue Conc. Powder	645.80
Brill. Blue 2R Hly. Conc.	378.55
Blue RR Supra Powder	629.35
Brill. Blue 2R Supra Disp.	115.65
Dark Blue 2R Powder Fine	512.65
Blue BC Supra Disp.	419.65
Jade Green XBN Powder Fine	555.80
Jade Green XBN Acra Conc. Pdr	1026.05
Jade Green 2G Pdr. Fine	533.25
Jade Green 2G Ptg. Paste	125.40
Jade Green XBN Ptg. Paste	126.00
Jade Green 2G Supra Disp.	618.00
Olive D Pdr. Fine	563.90
Olive Green B Supra Disp.	421.70
Jade Green XBN Supra Disp. (N)	327.30
Olive OMW Powder Fine	698.55
Olive OMW Supra Disp.	538.05
Olive D Supra Disp.	361.70
Olive R Supra Disp.	470.25
Olive D. Ptg. Paste	193.00
Olive Green B Ptg. Paste	199.10
Olive Green B Acra Conc.	741.10
Olive R Acra Conc.	779.85
Brown R Pdr. Fine	869.45
Dark Brown 3R Fine	826.25
Brown G Supra Disp.	582.05
Brown 2G Supra Disp.	716.10
Brown R Supra Disp.	547.35
Brown BR Powder	867.75
Dark Brown 3R Ptg. Paste	217.15
Dark Brown 3R Supra Disp.	529.60
Brown G Acra Conc.	967.95
Brown M. Powder Fine	768.80
Grey M. Supra Disp.	585.45
Blue BC Acra Conc. Pdr. Fine	762.70
Direct Black AC Supra Disp.	415.75
Direct Black AC Pdr. Fine	574.70
Direct Black CH Supra Disp.	490.45
Direct ACD Ptg. Paste	217.15

Delhi Market

DELHI: MAY 19, (NNS) The trend in Delhi chemicals market remained mixed during the week ended says NNS. Prices of some of the items of chemicals went up to a new high while some items ruled easy due to better supply and poor offtake by local and outside stockists caused by extreme heat weather. Turnover was of a normal nature.

Citric acid flared up by Rs. 50/75 at Rs. 2,325/2,500 per 50 kg due to poor import from China as well as dwindling stock position in the market. In the wake of negligible stock under the control of stockists along with fall in import from France, tartaric acid jumped up by Rs. 100 at Rs. 7,550 per 50 kg. Seasonal demand was also good.

Boric acid technical recorded a rise of Rs. 70 and touched a new level of Rs. 1,300 per 50 kg due to lack of supply and higher demand by seasonal face powder manufacturers. While borax granular and crystal dropped by Rs. 30/35 at Rs. 680 and Rs. 685 per 50 kg on better supply and slack demand.

Chatkolite jumped up by Rs. 4 at Rs. 70 per kg due to acute shortage of stock. It is noticeable that a rise of Rs. 10 was recorded in this commodity within two weeks. Rangolite Germany hardened by Rs. 2 at Rs. 73 per kg in the absence of supply. Sodium hydrosulphite Tamil Nadu was cheaper by 50 paise at Rs. 37.25 thanks to good offerings and poor demand by Gur Khandsari manufacturers. In the absence of any supply from Sambhal, Moradabad, Chandausi, Rampur and Amroha areas of U.P. along with keen demand made by consumers and stockists, menthol bold spurted by Rs. 30 at Rs. 290 per kg. Menthol medium also followed suit and rose from Rs. 240 to Rs. 275 per kg. Menthol flake also traded higher at Rs. 232 against Rs. 218. Mentha oil hardened from Rs. 160 to Rs. 185 and DMO ruled quiet at Rs. 80 per kg.

In the absence of supply from Assam, paraffin wax looked up again by Rs. 20 at Rs. 770 per 50 kg. Formic acid went up by Rs. 1.50 at Rs. 27.50 per kg due to acute shortage of raw material and higher advices from Bombay. In Bombay formic acid was traded at Rs. 28 per kg. Acid slurry soft hardened by Re. 1 at Rs. 25 per kg in the wake of good demand made by detergent powder manufacturers.

Due to fall in arrivals from Kerala along with heavy mutual speculation between distributors and stockists, titanium dioxide anatase and RC-822 jumped up sharply by Rs. 2/5 and touched a new level of Rs. 108 each per kg. In the first week of April titanium dioxide anatase and RC-822 were quoted at Rs. 75 and Rs. 80 per kg.

(DELHI MARKET RATES AS ON MAY 19, 1989)

Ammonia Bicarb (Per 25 Kg.)	145.00
Mercury (Per flask)	12,500.00
Soda ash (Per bag)	340/345.00
Ammonium Chloride (50 Kg.)	110/180.00
Caustic soda flakes (50 Kg.)	530/535.00
Citric acid (Per 50 Kg.)	2,325/2,500.00
Stable Bleaching Powder Shriram (Per 25 Kg.)	100.00
Stable Bleaching Powder KCl (Per 25 Kg.)	95.00
Stable Bleaching Powder Maruti (Per 25 Kg.)	90.00
Stable Bleaching Powder Modi (Per 25 Kg.)	98.00
Sodium Bicarbonate (50 Kg.)	285/300.00
Sodium Hydrosulphite (Per Kg)	35.00/40.00
Rangolite (Per Kg.)	70.00/73.00
Boric acid Technical (Per 50 Kg.)	1,300.00
Paraffin Wax (Per 50 Kg.)	770.00
Tartaric Acid (Per 50 Kg.)	7,550.00
Borax Granular (Per 50 Kg.)	680.00
Borax Crystal (Per 50 Kg.)	685.00
Sodium Nitrite (Per 50 Kg.)	660/760.00
Sodium Nitrate (Per 50 Kg.)	415.00
Camphor Thal (Per Kg.)	
Camphor Powder (Per Kg.)	
Menthol Bold (Per Kg.)	2
Menthol Medium (Per Kg.)	2
Menthol Flake (Per Kg.)	2
Glycerine (Per Kg.)	52
Sodium Silicate (Per quintal)	250/3
Hexamine (Per Kg.)	
Acetic Acid Glacial (Per Kg.)	
Copper Sulphate (Per quintal)	2,250/
Formic Acid (Per Kg.)	
Formaldehyde (Per Kg.)	
Hydrogen Peroxide (Per Kg.)	27.50/2
Calcium Carbonate (Per Tonne)	2,500/4
Acid Slurry Soft (Per Kg.)	2
Acid Slurry Hard (Per Kg.)	3
Phosphoric Acid (Per 50 Kg.)	1,05
Potassium Nitrate (Per quintal)	900/1,20
Potassium Permanganate (Per 50 Kg.)	4,900
Sodium Bichromate (Per 50 Kg.)	1,575/1,600
Trisodium Phosphate (50 Kg.)	500/525
Titanium Dioxide Anatase (Per Kg.)	108
Titanium Dioxide RC-822 (Per Kg.)	103
Zinc Oxide (Per metric tonne)	42,000/52,000
Phenol Carbolic Acid (Per Kg.)	37
Carbon Tetrachloride (Per Kg.)	24
Chloroform (Per Kg.)	28
Sodium Sulphate (Per metric tonne)	N
Naphthalene Balls (Per 50 Kg.)	1,450

DYES & COLOURS	(Per K
Naphthol AS	162
Naphthol ASG	252
Naphthol AS2S	250
Naphthol ASTR	325
Naphthol ASOL	208
Naphthol ASBO	225

DIRECT DYES	(Per K
Black E. Conc.	110/160
Diazo Black B.T.	105/135
Green B	100/127
Blue 2-B	60/92
Sky Blue FB	213
Basic Auramine	55/110
Basic Rhodamine	250/400
Basic Methylene Blue	92/130
Basic Violet	145/170
Basic Malachite Green	150/165
Acid Orange	45/88

Madras Market

The activity in the market has been moderate. There is a slight decline in the caustic soda flakes prices to Rs. 12,600 per MT though caustic lye prices remained stable at Rs. 8,700 per MT. There is apprehension that electricity tariff in Andhra Pradesh may be revised upward. Soda ash prices have remained stable though the manufacturers have increased the prices by Rs. 200 to Rs. 300 per MT recently. The impact of increase is less as the supplies are plentiful. There has been increased demand for the heavy normal paraffin produced by Tamil Nadu Petro Products Ltd. mostly from upcountry sources on account of a fire in IPCL's unit and this might put the production at IPCL's LAB plant to disarray till July/ August 1989.

(MADRAS MARKET RATES AS ON MAY 20, 1989)

Acetic Acid Glacial (per kg)	18.00
Aluminium Sulphate Iron free (per MT)	4,800.00
Ammonium Bicarbonate (per 25 kgs)	125.00
Ammonium Chloride (per MT)	3,000.00
Acid Slurry (per kg)	30.00
Barium Carbonate (per kg)	6.00
Barium Chloride (per kg)	5.00
Boric Acid Technical (per kg)	24.00
Bleaching Powder (per 50 kgs)	220.00
Borax (per 50 kgs)	650.00
Caustic Soda Flakes -- Mettur Chemicals (per MT)	12,600.00
Caustic Soda Flakes -- Andhra Sugars (per MT)	12,600.00
Calcium Chloride 70% Solid (per MT)	3,000.00
Calcium Chloride Anhydrous (per MT)	5,750.00
Calcium Carbonate (Activated) (per MT)	5,750.00
Calcium Carbonate (Precipitated) (per MT)	5,000.00
Citric Acid (per kg)	48.00
Copper Sulphate (per kg)	24.00
Cresylic Acid 98-99% (per kg)	107.00+ED
Pure Para Cresol 96% (per kg)	77.00+ED
Meta Para Cresol 42% (per kg)	47.00+ED
Formic Acid (per kg)	27.00
Formaldehyde (per kg)	8.00
Glue Flakes (per kg)	15.00
Glycerine (per kg)	48.00
Hydrosulphite of Soda (TCPL) (per kg)	40.00
Hydrosulphite of Soda (IDI) (per kg)	42.00
Hydrosulphite of Soda (BASF) (per kg)	42.00
Hexamine (per kg)	29.00
Hyflo Supercell (per kg)	19.50
Hydrogen Peroxide (per kg)	29.00
Litharge (per kg)	40.00
Lead Acetate (per kg)	42.00
Magnesium Carbonate (per kg)	19.00
Magnesium Chloride (per kg)	3.00
Maleic Anhydride (per kg)	40.00
Menthol Crystals (per kg)	240.00
Oxalic Acid (per kg)	24.00
Paraffin Wax (per kg)	14.00
Potassium Bichromate (per kg)	36.00
Phosphoric Acid (per kg)	22.00
Polyvinyl Alcohol powder (per kg)	130.00
Pentaerythritol (per kg)	52.00
Phthalic Anhydride (per kg)	30.00
Soda Ash (TAC) (per 75 kgs)	370.00
Soda Ash (TATA) (per 75 kgs)	370.00
Sodium Bicarbonate (TATA) (per 50 kgs)	375.00
Sodium Silicate (per MT)	3,200.00
Sodium Bichromate (per kg)	26.00
Sodium Nitrate (per kg)	8.00
Sodium Nitrite (per kg)	15.00
Sodium Sulphide Flakes (per kg)	12.50
Sodium Bisulphite (per kg)	4.35
Sodium Alginate (per kg)	210.00
Sodium Acetate (per kg)	7.00
Sodium Sulphate (Anhydrous) (per kg)	3.00
Titanium Dioxide (Anatase) (per kg)	72.00
Titanium Dioxide (Rutile) (per kg)	92.00
Trisodium Phosphate (per kg)	7.00
Urea (Technical) (per kg)	3.00
Zinc Oxide (per kg)	50.00
Zinc Chloride Powder (per kg)	12.00
Zinc Sulphate (per kg)	6.50

SOLVENTS

Acetone -- HOCL (per kg)	18.50
Butanol (per kg)	35.00
Butyl Acetate (per kg)	42.00
Benzene (per lit)	12.00
Cellosolve (per kg)	50.00
Carbon Tetra Chloride (per kg)	22.00
Chloroform (per kg)	25.00
Diacetone Alcohol (per kg)	29.50
Diethylene Glycol (per kg)	43.00
Dichloroethane (per kg)	16.00
Di-octyl Phthalate (per kg)	48.00
Di-N-butyl Phthalate (per kg)	48.00
Ethyl Acetate (per kg)	20.00
Isopropyl Alcohol (per kg)	28.00
Methanol (per kg)	10.00
Methylene Chloride (per kg)	26.25
Methyl Ethyl Ketone (per kg)	43.00
Methyl Isobutyl Ketone (per kg)	38.50
Phenol (per kg)	34.00
Sorbitol (per kg)	15.00
Triethanolamine (per kg)	60.00
Trichloroethylene (per kg)	25.00
1-1-1 Trichloroethane (per kg)	27.00
Turpentine (per lit)	16.50
Toluene (per lit)	16.00
Xylene (per lit)	16.00

International Bulk Chemical Prices

Spot prices are as on May 10, 1989

Despite weak petrochemical demand, naphtha prices recovered to $ 178-180/ton cif NWE. Ethylene prices came down marginally to $ 870-890/ton cif NWE following weakening demand. Reduced trading in propylene brought down prices to $ 595-605 cif. Butadiene remained stable. However, future supplies are expected to tighten. A glut in the benzene market caused prices to crash to $ 390-400/ton f.o.b. With sliding gasoline prices and lower gasoline imports, toluene prices fell down to $ 330-340/ton f.o.b. NWE. Lack of sustained demand caused paraxyl drop to $ 650-660/ton f.o.b. X orthoxylene remained stable. S continued to tumble with T1 bein at $ 710-720/ton cif NWE. The are expected to lower further on ac of high European inventories.

Product	European Spot price range $/ton	US price range $/ton
Ethylene	870- 890 (cif)	727- 747
Propylene (100% basis)	595- 605 (cif)	462- 528
Butadiene	285- 295 (fob)	396- 418 (spot)
Benzene	390- 400 (fob)	420- 423 (spot)
Toluene	330- 340 (fob)	343- 346 (spot)
Xylenes (virgin)	460- 465 (fob)	465- 471 (spot)
(solvent)	455- 460 (fob)	n.a.
Styrene	770- 790 (T2) (fob) 710- 720 (T1) (cif)	815-837 (spot)
Paraxylene	650- 660 (fob)	n.a.
Orthoxylene	450- 455 (fob)	n.a.
Ammonia	168- 170 (c&f)	142- 150 (fob)
Methanol	156- 160 (T2) (fob) 139- 142 (T1) (cif)	158- 160 (fob)
Naphtha	178- 180 (cif)	n.a.

Shipping News

VESSELS DUE IN BOMBAY FOR EXPORT LOADING

Due Date (1)	Steamer's Name & Flag (2)	Agents (3)	Will load for (4)	Appr sailin (5)
1/6	Seacrest Pioneer/ (Ger) (V-011)	Merzario	Jeddah; Hodeidah; P. Sudan;Ravenna; Ancona; Piraeus; Venice; Trieste. (Carting at M.O.D. No. 2)	7/6
1/6	Lanka Amila (Ger)	Seahorse	Hodeidah; Jeddah; Aquaba; Alexandria (Direct); Felixstowe; London; Liverpool; Manchester; Avonmouth; Dublin; Glasgow; Wembly; Leicester; Immingham; Birmingham; Leeds; Antwerp; Bremen; Copenhagen; Gothenburg; Hamburg; Rotterdam; Oslo; Stockholm; Helsinki; Aarhus; Malmao; Norkopping (Carting at M.O.D. No. 3)	5/6
1/6	Oyster Bay	Tata Tea	Assab; Djibouti; P. Sudan	5/6
4/6	Yulius Fuchik (Rus) (Voy-99 W/B)	Transocean	Odessa; Izmail; Reni(U.S.S.R.); Russe; Bulgaria; Budapest (Hungary); Linz; Vienna (Austria); Bratislava (Czech); Deggendorff; Regenborg; (West Germany); (All ports on River Danube) (Carting at N/O-PD & G-PD)	5/6
7/6	Arab Mazin	Depe	Aden; Jeddah	17/6
1/6	Oyster Bay	Tata Tea/	Mombasa; Dar es Salaam (Direct); Beira; Mahe & Inland Destinations	5/6

(2)	(3)	(4)	(5)
(V-4041) (Br)		in East Africa	
	Arebee	Mombasa & Dar es Salaam(Direct); Seychelles; Nacala: Maputo; Kampala; Jinja, Also Inland Destinations in East Africa	
Banglar Robi (V-3)	Sai Ship	Mogadiscio; Mombasa; Dar es Salaam (Carting at W.B. No. 3)	4/6
Vishva Nandini (Ind)	S.C.I.	Seychelles; P. Louis; Tamatawe; Mombasa; Dar es Salaam (Direct); Beira; Maputo; Via Mombasa & Inland Destinations in E. Africa (Reefer Space) (Carting at Timber Pond No. 1)	5/6
Lanka Amila	Seahorse	Colombo (Carting at M.O.D. No. 3)	5/6
L. M. Noble Lady	Silvership	Chittagong	11/6
Lanka Amila	Seahorse	Singapore; Penang; P. Kelang; Bangkok; Hongkong; Keelung; Kobe; Yokohama; & FCL only Busan; Inchon; Osaka; Tokyo; Nagoya; Kaohsiung; (Carting at M.O.D. NO. 3)	5/6
S/o. Tripura (Ind)	S.C.I.	Main Japan Ports. (Carting at Timber Pond No. 1)	5/6
Lyudmila Stal	Transocean	Singapore; Kobe; Nagoya; Yokohama	3/6
L. M. Noble Lady	M.C.S./ Silver Ship	Singapore; Surabaya; Djakarta & Other Far East Ports Singapore; Far East & Japan Ports	11/6
Lanka Amila	Seahorse	Brisbane; Fremantle; Sydney; Melbourne; Adelaide; (Carting M.O.D. No. 3)	5/6
L. M. Noble Lady	Silver Ship	Sydney; Melbourne; Brisbane; Adelaide; Fremantle; Auckland; Wellington; Lyttleton; P. Chalmers	11/6
Ardal	Mackintosh	Muscat; Dubai	7/6
Seacrest Pioneer/ (Voy-012)	Merzario	Dubai; Sharjah; Abu Dhabi; Muscat; Doha; Damman; Kuwait; Bahrain (Carting at 14-VD for Merzario)	7/6
Lanka Amila	Seahorse	Dubai; Khorfakkan; Abu Dhabi; Sharjah; Muscat; Doha; Damman; Riyadh; Kuwait; Bahrain (carting at M.O.D. No. 3)	5/6
Mowlavi	J.M. Baxi	Bandar Abbas	7/6
Seacrest Pioneer	Seaspeed	West African Ports (Carting at Hay Bunder No. 5)	7/6
Lanka Amila	Seahorse	New York; Baltimore; Savannah; Norfolk; (Carting at M.O.D. No. 3)	5/6
Seacrest Pioneer	Seaspeed	New York; Baltimore; Norfolk; Savannah; Charleston; Houston; & South American Ports (Carting at Hay Bunder No. 3)	7/6

VESSELS DUE IN BOMBAY FOR IMPORT DISCHARGE

e Date	Steamer's Name	Agents	From
6	Antje	Sai Ship	U.K. Cont
	Diana (V-Th 29)	Choice	S. America
	Pericles	Sai Ship	Brazil
	Richmond (V-Th-23)	Choice	S. America
	Yulius Fuchik (V-99)	Transocean	U.S.S.R

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ACETYL SULPHANILYL ORIDE: From Japan: Metro rters Pvt. Ltd., 60 MTs., 9,23,280; Standard Organics Ltd. Ts., Rs. 17,38,403.

LYL BROMIDE: From Japan: Exports Ltd., 500 Kgs., ,08,101.

LYL CHLORIDE: From Japan: ressive Chemicals Corpn., 2,160 , Rs. 70,707.

LUMINIUM OXIDE SYNTHE- From USA: Carborundum Univer- td., 24,000 Kgs., Rs. 13,10,771.

MINO ACIDS: From Japan: lets India Ltd., 490 Kgs., 2,69,238.

MMONIUM ADIPATE: From n: Keltron Component Complex , 500 Kgs., Rs. 35,135.

MMONIUM PENTABORATE: n Japan: Keltron Complex Ltd., 0 Kgs., Rs. 1,38,691.

ROMATIC CHEMICALS: From ce: N. Ranga Rao & Sons, 2,000 ., Rs. 3,44,095; From FRG: Bush ke Allen (I) Ltd., 500 Kgs., 7,981; N. Ranga Rao & Sons, 135 .., Rs. 52,000; From Switzerland: vinda Parmiala Works, 200 Kgs., 81,345; From UK: Bush Boake en (I) Ltd., 4 Kgs., Rs. 2,552.

RSENIC TRIOXIDE: From nce: Southern Petrochemicals Indl. rpn., 18.810 MTs., Rs. 2,14,800.

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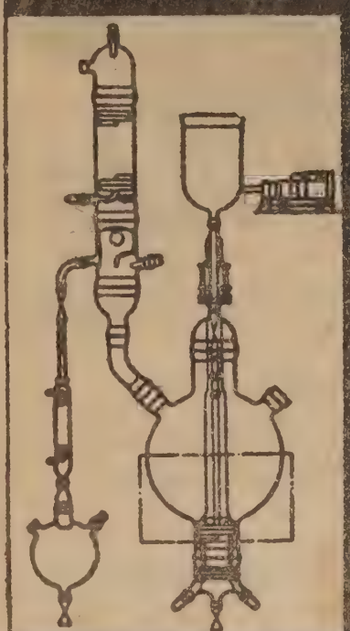

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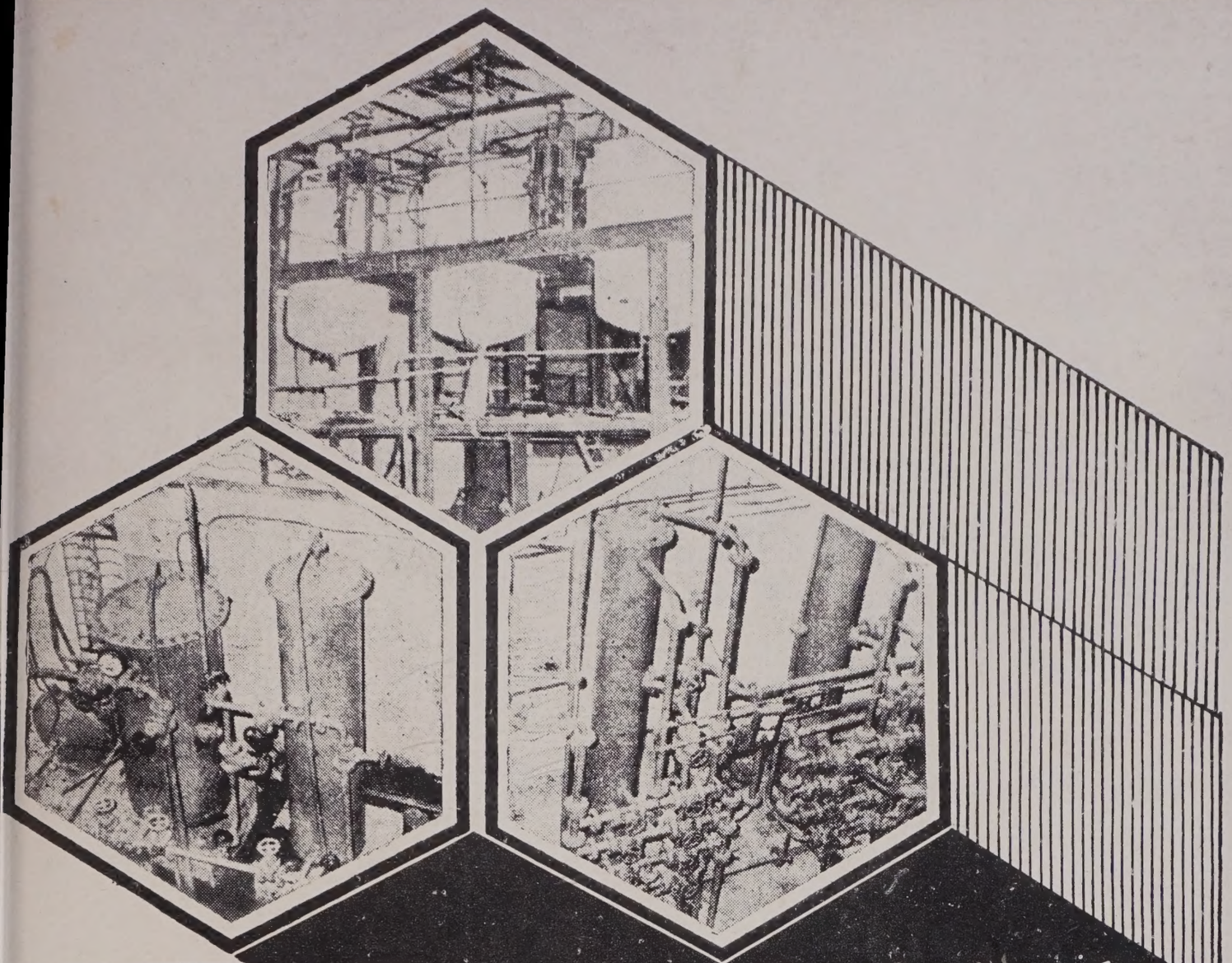

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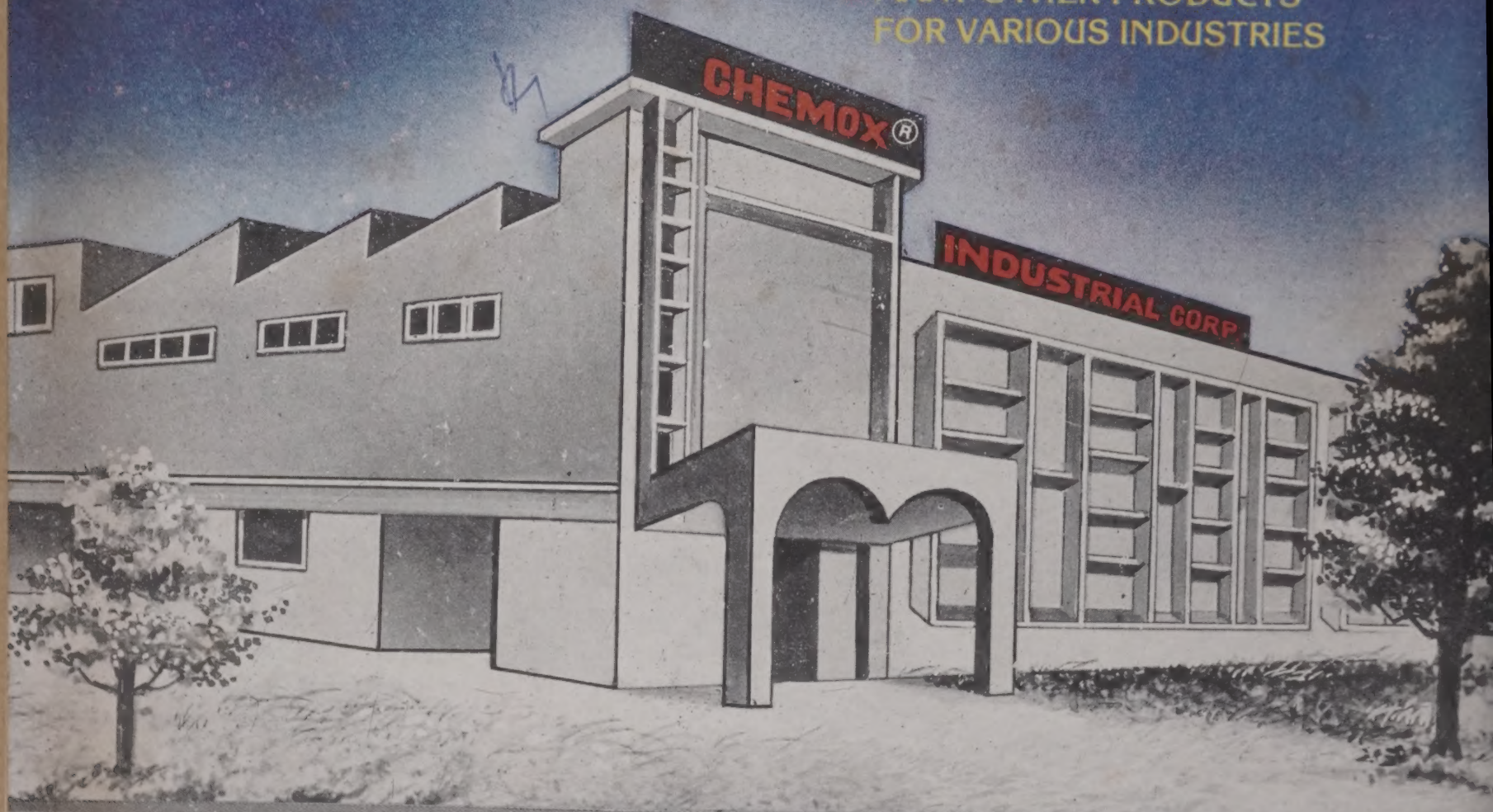

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